



# DIRECTV COM1000

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## Integrator's Manual



**Software Version**  
**ST02.08.07**

**REV. 2.72**

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# 1 INTRODUCTION

This document describes the processes and procedures for configuring a COM1000 system. The following sections will provide a brief overview of the system hardware, an in-depth guide to the COM24 user interface, and descriptions of certain system processes. Also included are several indices that cover common troubleshooting problems.

It is recommended that you read through the entirety of the manual, or at least review the main sections before working with the system, as it contains some important pointers that may come in handy during setup and maintenance.

The table below provides an explanation of some useful terms and device names that will be referred to throughout the manual. You should use these terms to familiarize yourself with the different aspects of the system before proceeding any further.

**Table 1 – Definition of Terms**

Term	Definition
<b>COM1000</b>	This is the complete system, consisting of the following: one or more COM100 (now discontinued) or COM200 chassis, COM120 or SWM units, an optional gigabit Ethernet switch, and QAM24 cards or alternatively commercial edge QAMs.
<b>COM120</b>	A RF (radio frequency) distribution panel, which is necessary to enable K <sub>a</sub> B band signal delivery. The manual will use this device as a reference, but it may be replaced with a similar device of your choosing.
<b>COM200</b>	A chassis that can support up to 12 receiver cards. This chassis contains an integrated gigabit Ethernet switch and Ethernet Card, but does not include other necessary equipment such as an edge QAM device, Ethernet switches, or RF distribution and signaling electronics.
<b>COM100</b>	The first-generation chassis of the COM1000 series chassis, similar in structure to the COM200 but lacking backplane Ethernet connections. This product was discontinued in 2010.

Term	Definition
<b>COM24</b>	Individual DIRECTV receiver card that fits within a COM200 chassis and is capable of sourcing 2 DIRECTV HD or SD channels.
<b>COM24FLX</b>	Individual DIRECTV receiver card that fits within a COM200 chassis and is capable of sourcing 3 DIRECTV SD channels. Software upgradeable to 2 HD channels with a software upgrade license purchase.
<b>QAM6</b>	The QAM6 is an optional circuit board (i.e., internal Edge QAM) that replaces the Ethernet Card in the upper left side of a COM200 Chassis. The board provides 6 QAM channels in addition to a system management Ethernet port. Each QAM channel can carry 2 HD or 8 SD video channels. The QAM6 can be expanded up to 12 QAM channels, 2 at a time, by purchasing a SWQAM2.
<b>SWQAM2</b>	The SWQAM2 is a software key that will enable 2 QAM channels per key on a QAM6 card. By purchasing 3 SWQAM2 keys a QAM6 can be expanded to 12 QAM channels.
<b>QAM24</b>	An optional circuit board (i.e., internal Edge QAM) that replaces the Ethernet Card in the upper left side of a COM200 Chassis. The board provides 12 QAM channels in addition to a system management Ethernet port. Each QAM channel can carry 2 HD or 8 SD video channels. This product has been replaced by the QAM6 and the SWQAM2.
<b>ATSC8</b>	An optional eight channel off-air ATSC receiver that may be connected to and configured from a COM1000 system.
<b>Edge QAM</b>	QAM (Quadrature Amplitude Modulation) is the format by which digital cable channels are encoded and transmitted. An edge QAM is a device built to carry both video-on-demand and switched digital video streams. Makers include Technicolor, Arris, Harmonic Inc., Motorola, and Scientific-Atlanta/Cisco.
<b>Pro:Idiom</b>	An encryption technology used in the hospitality industry for the delivery of digital television signals of which Zenith Electronics LLC is the license holder. This is the encryption standard around which the COM1000 system is designed.



Term	Definition
<b>Transcription</b>	The process by which the COM 1000 system converts content streaming from DIRECTV's conditional access system to Pro:Idiom encrypted video.
<b>"Hot-swappable"</b>	The unit or device this term describes may be added to, removed from, or replaced within the system it is a part of without powering anything down.
<b>SD</b>	Standard Definition
<b>HD</b>	High Definition
<b>System Integrator</b>	The person or company that performs the onsite installation.
<b>System Operator</b>	The company or organization that typically holds the "right of entry" and is responsible for installation and all onsite support on a daily basis.
<b>SWM a.k.a. SWiM</b>	"Single Wire Multiswitch" - DirecTV Module used for selecting up to 8 satellite transponders for TV programs and 1 network transponder.
<b>Pseudo code</b>	The first five characters of the COM200 Chassis serial number (e.g., BC009). Identifies the version of the chassis. The serial number is found on the label on the rear of the COM200 chassis (see <b>Figure 3</b> ).
<b>GbE</b>	The Gigabit Ethernet card (GbE) is a card that when installed in slot 1 of a COM200 chassis provides a gigabit speed Ethernet port for use in stacking multiple chassis or for injecting ATSC signals into a QAM24 or QAM6.

## 2 COM1000 PRODUCT DESCRIPTION

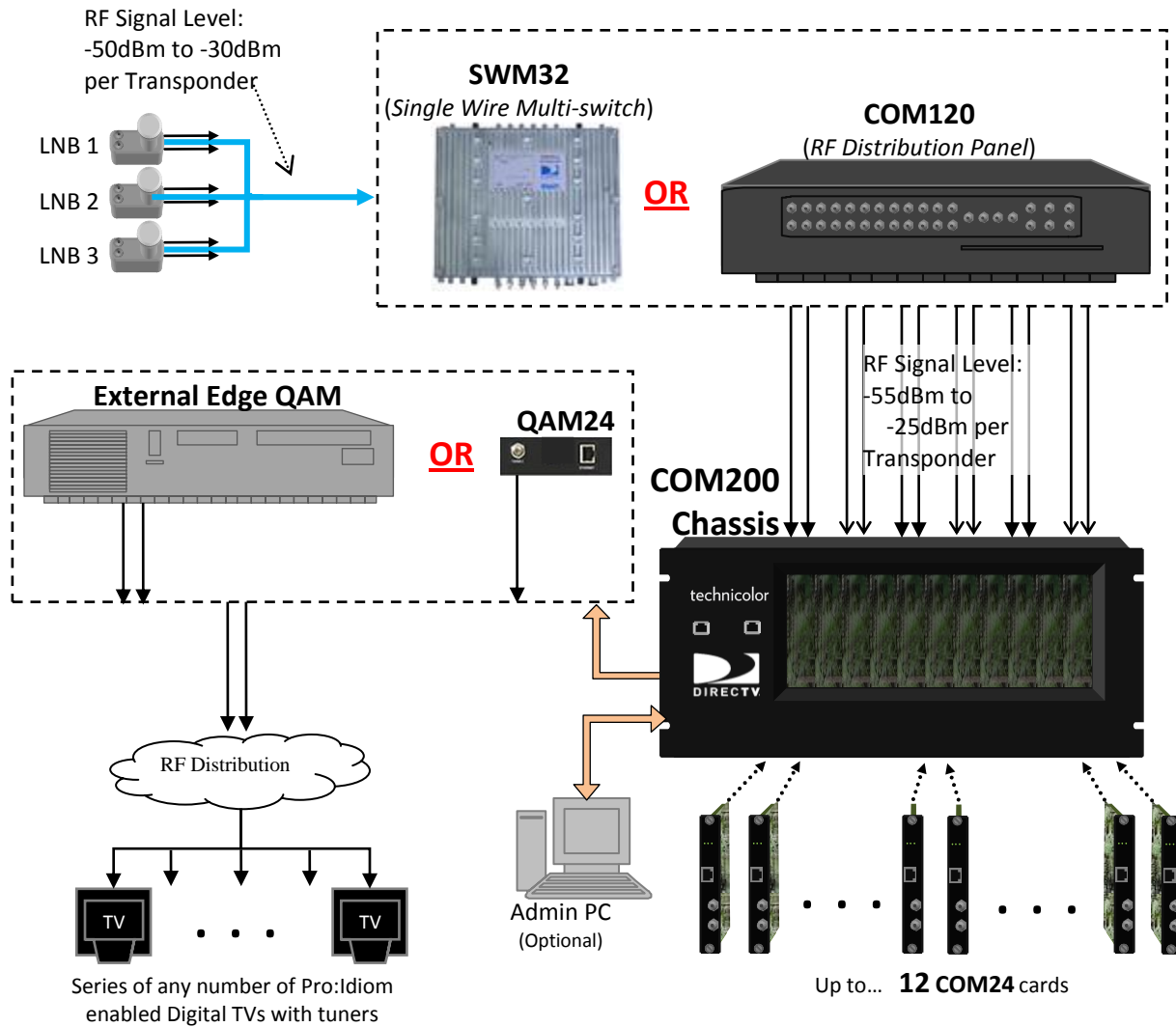
A fully populated COM200 chassis is capable of tuning and transcribing up to 24 DIRECTV HD channels or 36 SD channels. The satellite signal is tuned and demodulated resulting in a DIRECTV Legacy or MPEG-2 transport stream. This transport stream is then IP-encapsulated using standard Internet protocols and RFCs and is sent out via the Ethernet interface. The data leaving the system is in a format suitable for input to an edge QAM device or for distribution on an IPTV network. The original DIRECTV broadcast video encoding format (MPEG-2 or MPEG-4 compression) is preserved and the output transport stream is encrypted with the Pro:Idiom encryption standard.

Multiple COM200 chassis can be “stacked” in order to provide more than 24 HD or 36 SD output channels. While there is no technical limit to the number of COM200 chassis than can be configured in this manner, the DIP switches used for setting individual chassis IDs are only capable of providing 12 unique identifiers. Refer to **Section 4.1** for more information on this topic.

The COM24 receiver cards are controlled and managed via an Ethernet connection and do not contain an internal video decoder for viewing the currently tuned channels. The COM24 card does not operate like a traditional DIRECTV receiver. Specifically, COM24 cards do not perform any MPEG video or audio decoding. They do not provide a traditional Middleware based User Interface, and do not require a remote control device. The COM24 card includes a built-in web interface and must be configured using a web browser. The video output of a COM24 receiver can be viewed on a properly equipped commercial Pro:Idiom television or Pro:Idiom capable set-top box. Manufacturers of this equipment include but are not limited to LG, Phillips, Samsung, Sony, Enseco, and Technicolor.



Refer to **Figure 1** below for a diagram illustrating a complete COM1000 system.



**Figure 1 – COM1000 System Overview**

**COM1000 System** – This describes the entire video distribution system setup as seen above, including all devices and connections that work together to stream DIRECTV HD video programming.

**LNB (Low-Noise Block)** – This is a device that acts as the antenna of your satellite dish. It receives incoming signals and sends them to the RF distribution panel. Each one is capable of providing two outputs.

**COM120 (RF Distribution Panel)** – This device receives the incoming satellite feed via your dish receiver and distributes the signals using a series of multiswitches. It then sends these signals into the COM24 cards via the RF Inputs (labeled “Tuner 1” and “Tuner 2”).

**COM200 Chassis** – This device houses the COM24 and COM24FLX cards. All video traffic is routed through the Gigabit Ethernet (GbE) port on the rear of the chassis or to the QAM24. System management and control can be done by connecting a computer to one of the management ports on the Ethernet Card or QAM24 card (i.e., front of the chassis).

**Admin PC** – This is an optional device and is nonessential to normal system operation. It is recommended, however, as it can be useful in maintaining desired programming and monitoring system function. This can be a desktop or laptop computer equipped with an Ethernet port (or a USB port with Ethernet adapter), any of the recommended applications listed in **Section 5.1**, and a web browser of your choice.

**COM24 and COM24FLX Cards** – The bulk of this manual is dedicated to these cards. They are the means by which the property will be able to receive the desired television programming for their network and control the entire COM1000 system.

**QAM24 or QAM6 Cards** – An optional board that replaces the Ethernet Card in the upper left side of a COM200 Chassis. The board provides up to 12 QAM modulator channels in addition to a 10/100 Ethernet port to an Edge QAM. Each QAM modulator can carry two HD or eight SD video channels.

**Edge QAM** – In a typical installation, the COM24 cards will be configured to stream to this device. It converts the COM24’s IP-packetized streams to QAM-modulated RF for distribution throughout a property.

**Property Distribution Network** – This network, set up and maintained by the System Operator, will distribute any channels provided by the property. It may consist of any configuration of devices as defined by the System Operator.

**Pro:Idiom Enabled Televisions** – It is important to note that some Pro:Idiom compliant televisions only support MPEG-2 video compression. The COM24 card is agnostic to the

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content compression type and it will stream either MPEG-2 or MPEG-4 encoded transport streams.



### 3 MECHANICAL OVERVIEW

The following sections contain a brief overview of the devices that you will be interacting with along with the associated hardware. The intent is to give you a working knowledge of how the system operates under normal circumstances so that you will be able to recognize it when something goes wrong.

#### 3.1 COM200 Front View

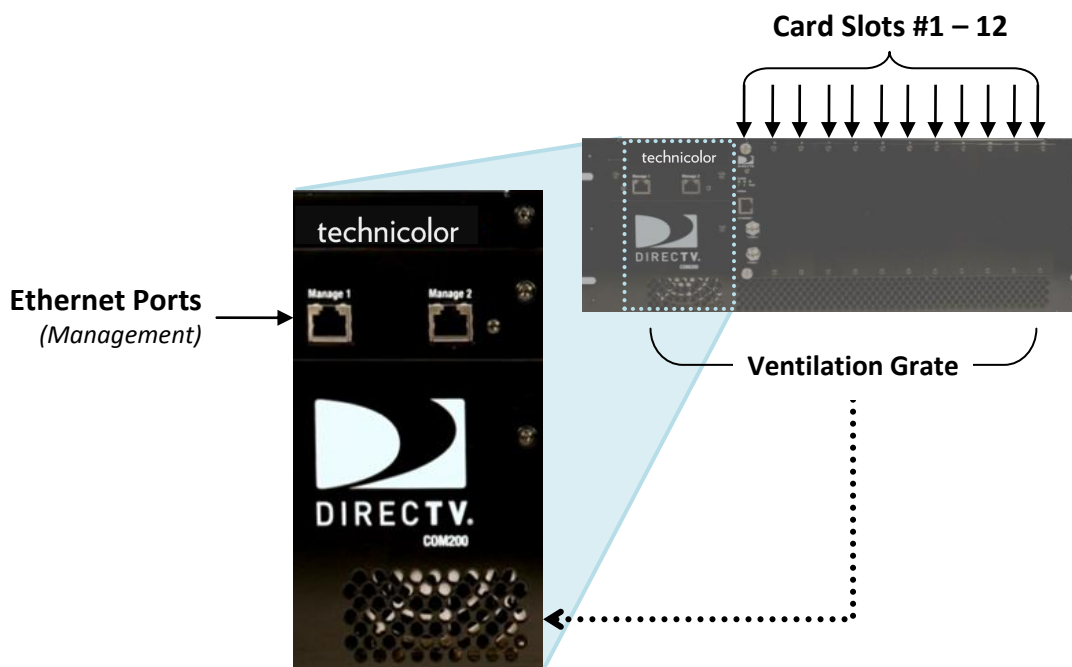


Figure 2 – COM200 Front View

Figure 2 above shows the faceplate of the COM200 chassis.

The two Ethernet ports on the far left, combined with the Gigabit Ethernet port in the rear (see Figure 3) allow for direct connections to other devices such as an edge QAM, Ethernet switch, and/or a management PC (optional) and allows any additional chassis in the system to be interconnected. If the chassis is using the QAM24 modulator, it replaces the Ethernet Card (See Section 3.7).

Along the bottom edge is the ventilation grate, which, combined with the exhaust fans in the back, allow air to flow over the internal system, cooling it.

The majority of the face shows the 12 available card slots, each corresponding to a unique Slot ID, capable of supporting 12 individual cards.



### 3.2 COM200 Rear View

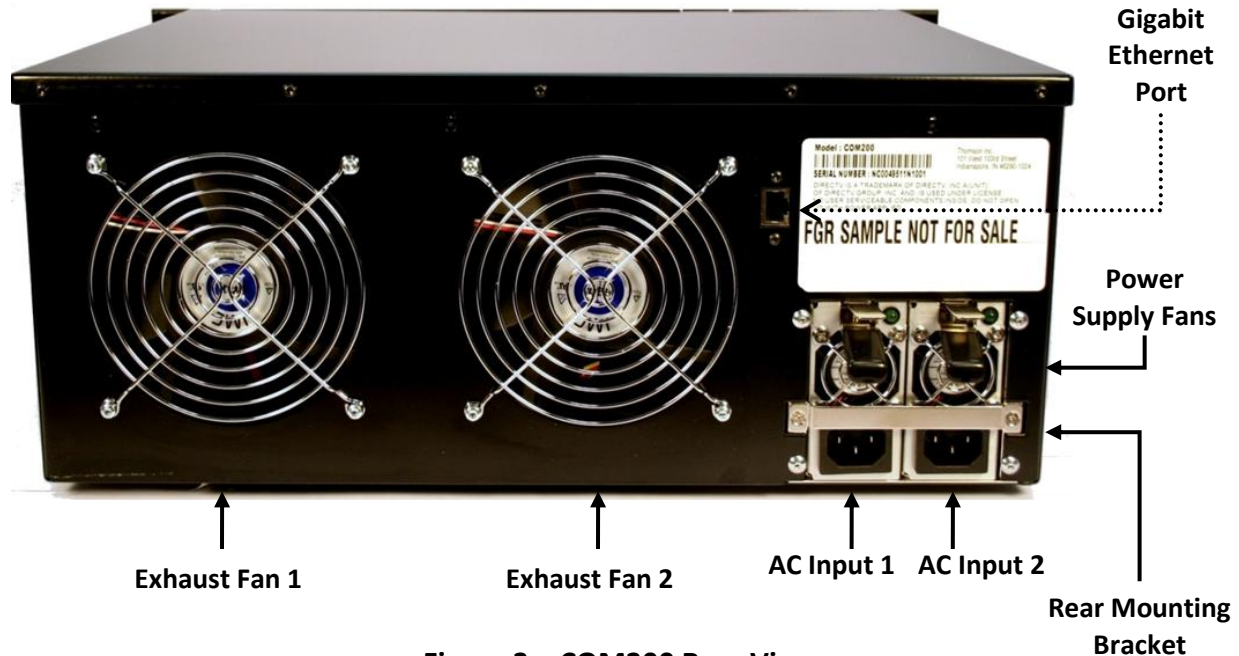


Figure 3 – COM200 Rear View

Figure 3 above shows the rear of the COM200 chassis.

The two AC input connections shown at the bottom right provide power to the COM200 chassis. Only a single AC input connection is required in order for the system to operate. However, utilizing both AC input connections creates a DMR (Dual Modular Redundant) system. In other words, the second power unit acts as a backup supply in case the first power module fails, providing a seamless transition to a functioning power supply. In the case of such an event, the rear mounting bracket just below the power supply fans must be removed in order to replace the failed module. It should be noted that the power supplies are hot-swappable.

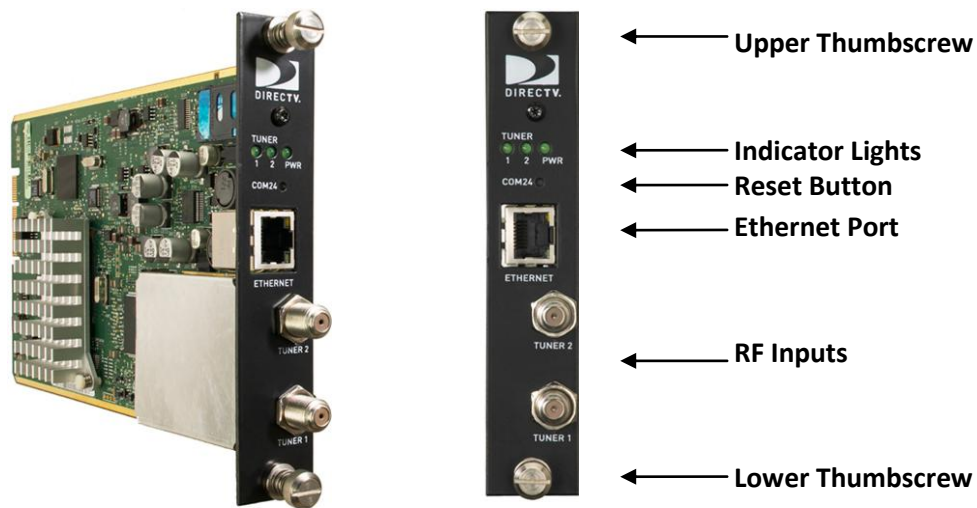
The COM200 chassis also contains two 5-inch exhaust fans to provide cooling to the system. Airflow is pulled through the ventilation grate on the front of the COM200 chassis across the COM24 cards and out the back. In the case of an equipment failure, the COM200 chassis can run with just one fan without overheating, but it is recommended that the broken fan is serviced and/or replaced as soon as possible.

The COM200 chassis also contains an integrated Gigabit Ethernet (GbE) port. This port provides the means of routing all COM200 traffic external edge QAM. If a QAM24 card is installed the external GbE port will NOT available for use as that port will be used to route traffic to the QAM24 card.

### 3.3 COM24 Card

The COM24 card is a customized DIRECTV receiver with a built-in smart card and has been specifically designed to meet the unique requirements of the Lodging and Hospitality market.

below shows a detailed picture of the COM24 card.



**Figure 4 - COM24 Card**

Each COM24 card contains two RF inputs, a 10/100Mbps Ethernet port, three indicator lights, a recessed reset button, and thumbscrews on either end. The cards are hot-swappable, allowing one card to be serviced independently of the other cards. In order to remove a card, simply loosen the thumbscrews that secure the card in place and pull it straight out of its slot.

Each RF input on a COM24 card feeds a dedicated DIRECTV tuner capable of supporting one channel of transcription. When both RF inputs are connected, the card is capable of streaming two Pro:Idiom encrypted HD channels simultaneously via the Ethernet port. The COM24 is designed such that each tuner on a card only needs to be set once. Once configured, the cards should remain locked unless there is a disruption in the signal due to weather, dish misalignment, or other RF distribution issues. However, the cards will automatically recover when the disruption to the RF is removed.

The COM24 card only works with DIRECTV input signals in the range of 950 - 2150 MHz (when used in conjunction with the required B band converters). Software version ST02.05.11

or newer supports SWM (Single-Wire Multiswitch) inputs. A RF distribution panel is required to support the COM200 to enable delivery of K<sub>a</sub> B band signals.

If using a SWM, the SWM must be connected to the Tuner1 F connector (lower) and must be powered up at the time that the COM24 is booted since the COM24 only detects a SWM at power on. If the first tuner is receiving HD channels from satellite 103 and a multi-switch is being used, then satellite 119 must also be received for background guide monitoring. However, if using a SWM and receiving HD channels from satellite 103, then satellite 119 reception is not required since satellite 101 will be used for background guide monitoring instead whenever in SWM mode.

**See Section 8.1 for an explanation of indicator light diagnostic capabilities.**

### 3.4 COM24FLX Card

The COM24FLX card is a variant of the standard COM24 card that only supports SWM connections. It is configurable as a three channel standard definition or two channel high definition satellite receiver. The COM24FLX as purchased is only capable of receiving SD programming. To upgrade a FLX card to receive two HD channels, a license key must be purchased from Technicolor.

Almost all of the information regarding identification and configuration of the COM24 cards applies to the COM24FLX. The two exceptions are the number of configurable tuners and the upgrade of a COM24FLX from SD to HD. The COM24FLX tuners are configured exactly the same way as the COM24 tuners although if an HD channel is selected the card will return a channel number of 0 in the Discovery page. See **Section 6.8** for tuning instructions. See **Section 7.3** for upgrade instructions.



**Figure 5 - COM24FLX Card**

### 3.5 GbE Card

The COM200 chassis has an integrated Ethernet switch on the backplane. This switch provides gigabit speed on two ports. One of those is the port on the back of the chassis the other is card slot number one. The gigabit port that is available on the back of the chassis is the port that the QAM24 card uses when it is installed. In order to daisy chain chassis or to inject large amounts of data to the QAM24 in a Colony system you would need another gigabit port and that is where the GbE card comes in. By replacing the card in slot one with the GbE card you now have another gigabit speed Ethernet port that can be used to route data to the QAM24 card in that chassis. This card is also required for use of the ATSC8 receiver in the system if the QAM24 or QAM6 modulator is used.

### 3.6 XDR24 Card

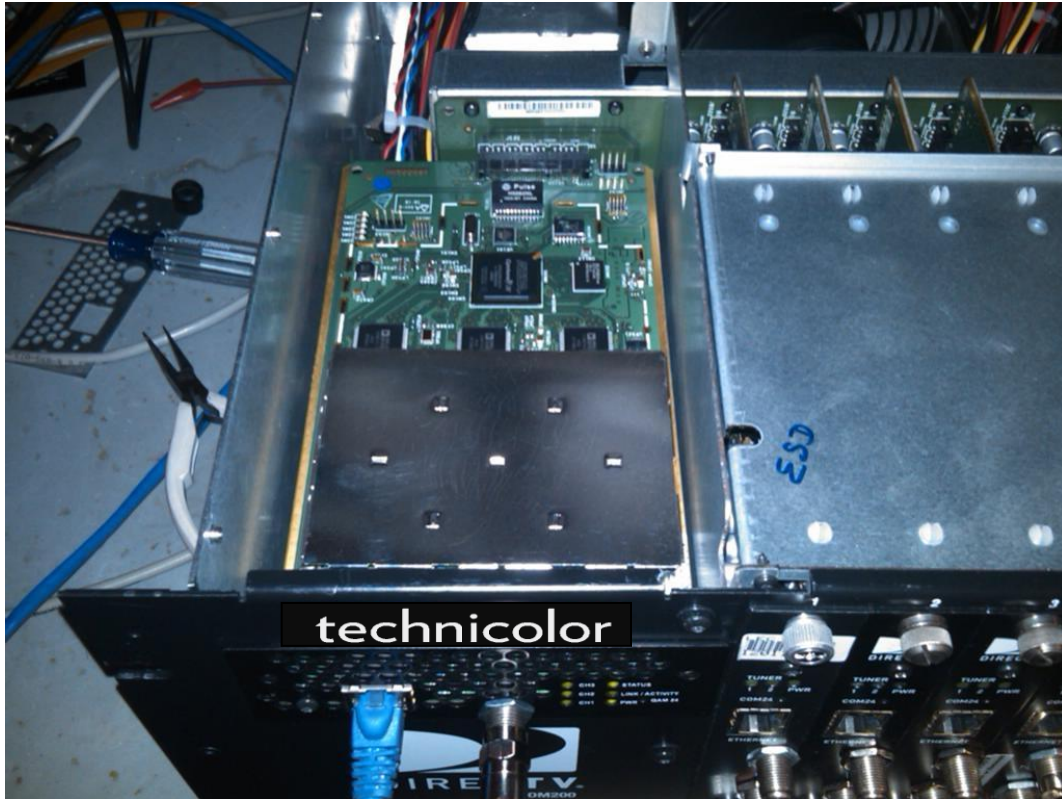
The XDR24 card is currently being deprecated. For additional support contact your equipment vendor or Technicolor.

### 3.7 QAM24 Board

The QAM24 card is an Edge QAM that is installed directly into the COM200 chassis. It connects to the COM24 cards via a GigE connection on the back edge of the card. This optional card replaces the Ethernet Card in the upper left side of a COM200 Chassis. The board provides 12 QAM modulators in addition to the front Ethernet port, which can be used to manage the



COM1000 system. Each QAM channel can carry 2 HD or 8 SD video channels. The QAM24 can be configured from any COM24 running version ST02.05.05 or higher.



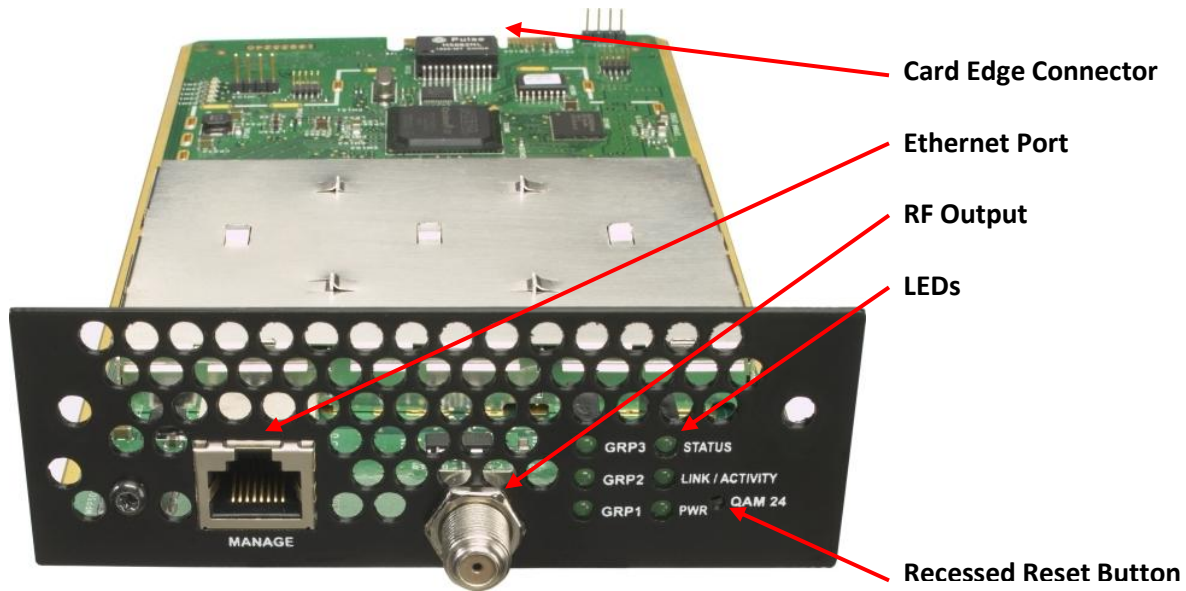
**Figure 6 – QAM24 Board installed in Chassis**

The QAM24 board plugs into the Ethernet Card slot and therefore replaces that card. There are no card guides in the chassis; the board is retained by front panel screws, which **MUST** be installed.

Install the QAM24 Board as follows:

1. Remove power from the chassis. Remember to unplug **BOTH** power cables.
2. Remove the chassis top cover to gain access to the slot connector and rear panel GbE port cable.
3. Unplug the rear panel Ethernet cable
4. Remove the switch access board.
5. Install the QAM24.
6. Tighten front panel retaining screws.
7. Plug power cables back into the chassis.

A front view of the QAM24 can be seen in **Figure 7**.



**Figure 7 – QAM24 Front View**

The QAM24 outputs three unique channel-grouping of four channels each according to the EIA North American Cable Television Frequency Plan (see EIA-542B) from the front RF connector. The four channels within each channel-grouping must be adjacent to one another and within the same band.

The QAM24 card contains six (6) green LEDs on its front panel that indicate power, GbE Link/Activity, and QAM status, as well as the link-status for each channel group.

The QAM24 card’s bottom-right LED represents the board’s power (PWR) state, lighting up once all on-board power regulators report the “good” state, and going dark when power is removed from the chassis or when a problem is detected on one of the regulators.

The QAM24 card’s middle- right LED represents the link and activity of the GbE interface on the back of the card.

The QAM24 card’s top- right LED represents the status of the QAM24 card. It is solidly-lit when the card is performing a software update. It is flashing if an over-temperature condition is detected on the card.

The QAM24 card’s left LEDs represent the link-status for each of the 3 channel groupings.

The QAM24 card contains a recessed button on its front panel to be used as a dedicated hardware reset for the FPGA processor. To complete an upgrade of the FPGA firmware a power



cycle is required.

The 10/100 Ethernet Interface on the front can be used to manage the COM1000 System.

## 4 GETTING STARTED

The COM1000 System is quite a bit different from the DIRECTV set-top box (STB) receiver traditionally used in these installations. This is because the COM1000 does not natively decode any audio or video, instead relying upon other devices in the system to decode and display the MPEG streams it produces. Furthermore, the COM1000 does not have any native user interface. Controlling and monitoring the COM1000 requires a Windows- based PC, and a web browser of your choice.

### 4.1 Setting up Multiple Chassis

For installations that require more than one COM200 chassis each chassis will need to be assigned a unique chassis ID. This can be done by removing the top cover of the COM200 and setting the DIP switches located on the backplane as shown in **Figure 8**.



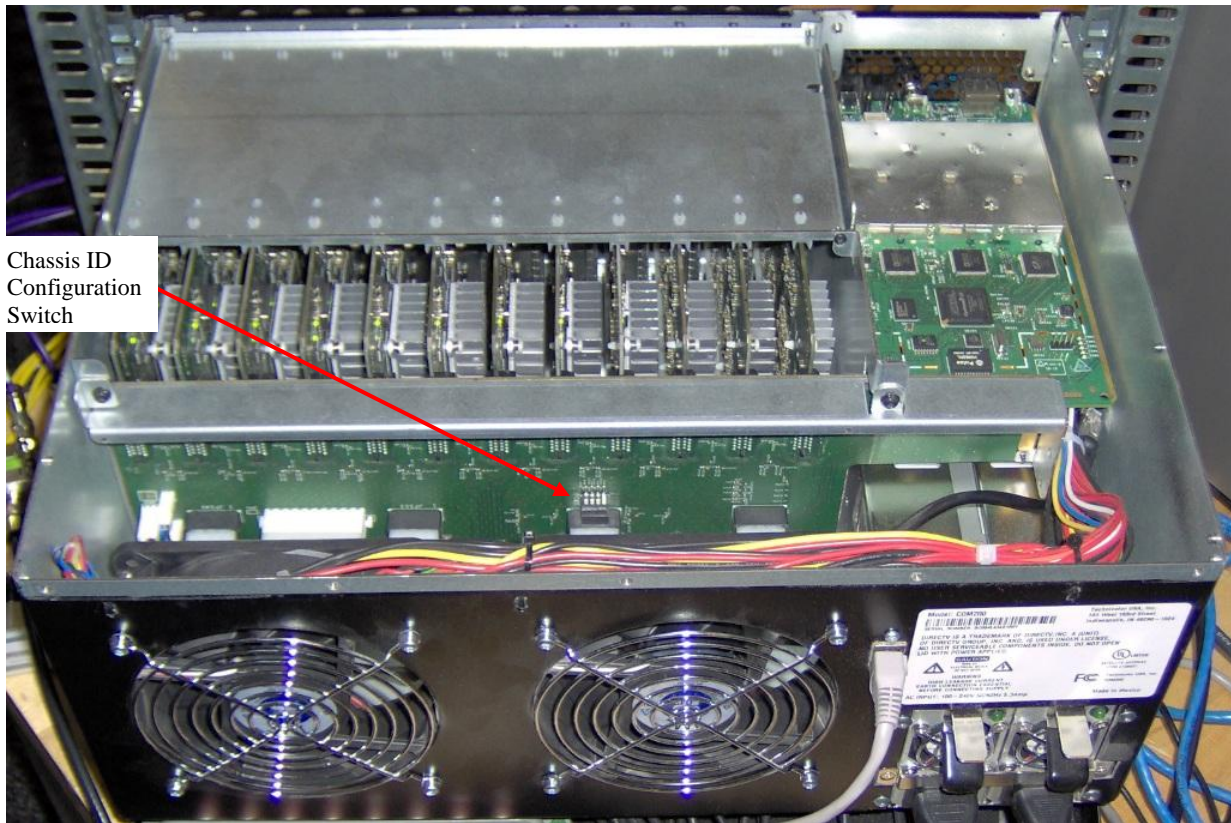


Figure 8 – COM200 Chassis ID Configuration Switch Location

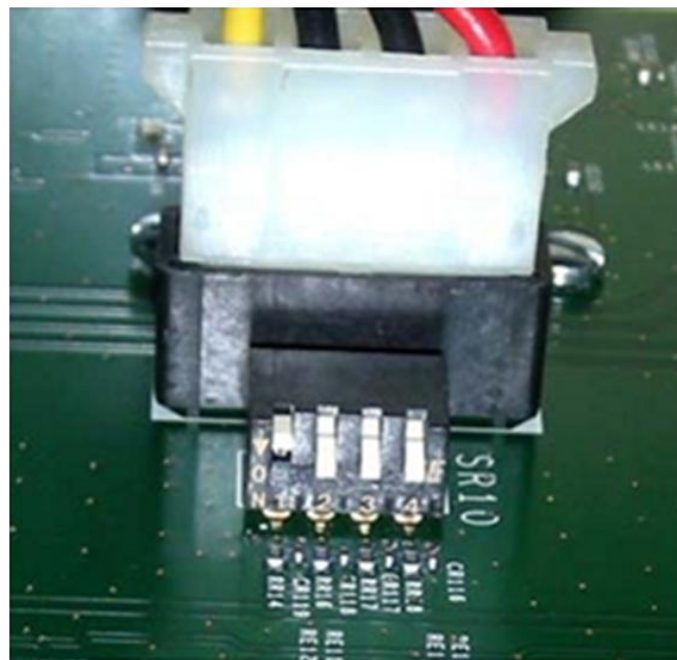


Figure 9 – COM200 Chassis ID Configuration Switch Closeup



The DIP switch pictured above will allow you to assign the chassis a unique ID between 1 and 12 by setting the switches as described in **Table 2**.

***Note:** The photo above and the table below are written as if you are standing with the front of COM200 facing you and are looking down on the rear side of the backplane.*

**Table 2 – COM200 Chassis ID Configuration**

Chassis ID	Switch #1	Switch #2	Switch #3	Switch #4
<b>1</b>	UP	DOWN	DOWN	DOWN
<b>2</b>	DOWN	UP	DOWN	DOWN
<b>3</b>	UP	UP	DOWN	DOWN
<b>4</b>	DOWN	DOWN	UP	DOWN
<b>5</b>	UP	DOWN	UP	DOWN
<b>6</b>	DOWN	UP	UP	DOWN
<b>7</b>	UP	UP	UP	DOWN
<b>8</b>	DOWN	DOWN	DOWN	UP
<b>9</b>	UP	DOWN	DOWN	UP
<b>10</b>	DOWN	UP	DOWN	UP
<b>11</b>	UP	UP	DOWN	UP
<b>12</b>	DOWN	DOWN	UP	UP

## 4.2 Installation Requirement Guidelines

Here are a few guidelines to keep in mind when installing the COM1000 system that will minimize the potential problems that the system could be expected to encounter.

### 4.2.1 General System Guidelines

- The optimum RF levels at the input of a COM120 or SWM are -30 to -50 dBm per transponder.



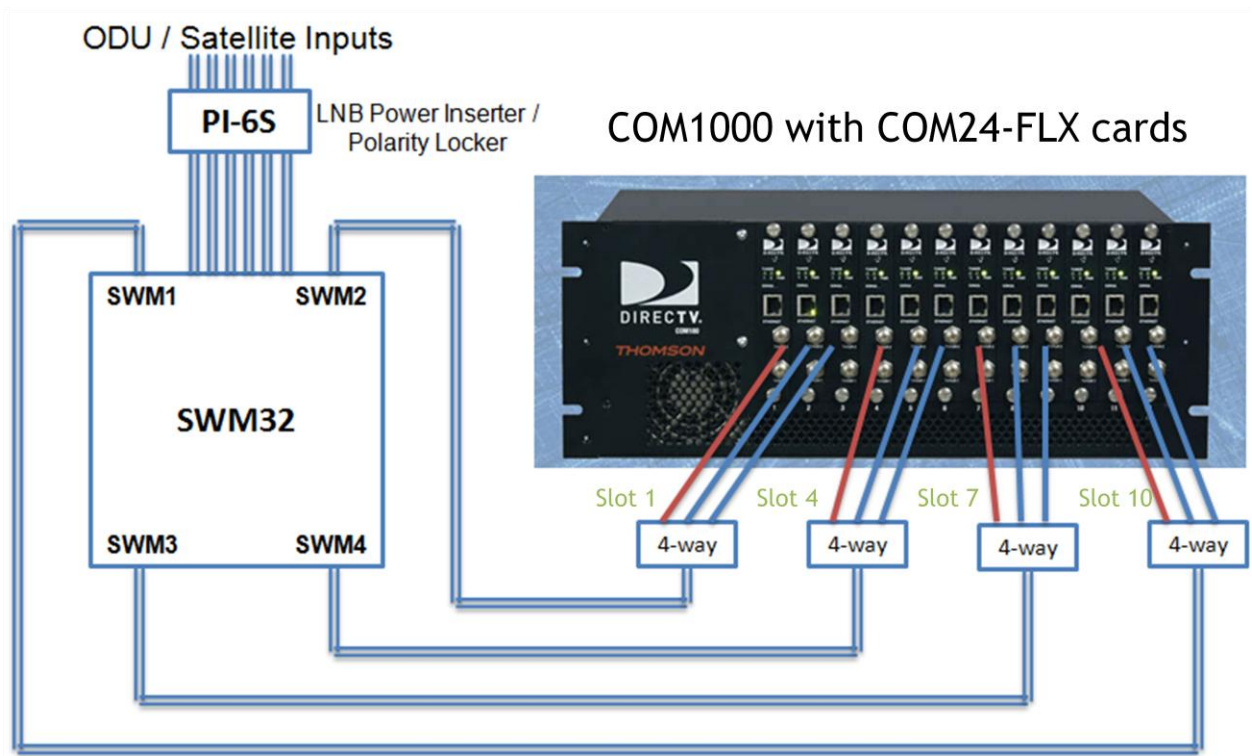
- The optimum RF input levels for the COM24 cards are -25 to -55 dBm per transponder.
- COM24FLX cards can only be connected to a SWM module, they will not support a multiswitch.
- The RF connections from the COM24FLX to the SWM module **MUST** be as shown in **Figure 10** or some channels will not be received properly. Cards in slots 1, 4, 7, and 10 **MUST** be on separate SWM outputs.
- Normal operational behavior of the COM200 chassis is achieved in ambient environments of 95°F (35°C) or less.
- The system will not be capable of streaming any video on any channel besides 100 until the COM24 cards have been authorized by DIRECTV.

#### 4.2.2 System Integrator Guidelines

- The system integrator must provide a mapping of TV channels to COM24 slots and tuners.
- The COM1000 will generally be preconfigured, including the appropriate RF and IP connections to an edge QAM device, which most likely is the QAM24.
- A COM120 RF Distribution panel, consisting of DIRECTV-approved multiswitches and  $K_a$  B band converters, or a DirecTV SWM-32 unit, shall be supplied by the System Integrator.

#### 4.2.3 System Operator Guidelines

- It is recommended to use the StarRoute SRSN4 Normalizer within the property's RF plant before the COM120 RF distribution panel in order to normalize the B band  $K_a$  signals with the traditional  $K_u$  satellite signal levels. B band signals are generally higher-powered and tend to saturate the converters unless the installer is very careful regarding input signal levels going into the COM120 panel.
- The operator must take care not to block the front and rear air passageways of the COM200 chassis. Racks containing doors and/or rear panels are not recommended.



The fourth port of every 4-way splitter must be terminated with 75Ω

Figure 10 - COM24FLX to SWM Module connections

## 5 CONFIGURING THE SYSTEM

This section will guide the integrator through the process of configuring a COM1000 to meet the needs of the system operator.

### 5.1 Useful tools

You should be aware that the firewall on your PC might prevent some of the following tools from working correctly. This is particularly true when attempting to execute file transfers to a COM24 card via a TFTP server.

#### 5.1.1 Configuration tool

Each COM24 card contains an embedded web-based user interface that can be used to configure all key parameters for all the components of the system, as well as providing access to crucial operating conditions like RF levels and authorization status. These controls can be accessed using your choice of web browser. Details on accessing the user interface are included in **Section 5.1.6** below.

#### 5.1.2 DHCP Server

Because the COM24 cards have the ability to remember their settings, once the system has been properly configured, the cards will retain whichever IP addresses were used last and will not need to obtain new ones from a DHCP server.

Even if the cards are assigned new IP addresses, they will continue to operate normally, but communicating with them after this happens can become somewhat problematic, especially if you are used to interfacing with a card at a specific IP address. Refer to **Section 5.1.6** below for recommendations on how to avoid this particular difficulty.

If you find that you need a DHCP server in your system, a useful multi-function tool that also provides access to a TFTP server and a sysloger is *Tftpd32*, which can be found at the following URL: <http://tftpd32.jounin.net/>.

**See Appendix A for more information on IP settings.**

### 5.1.3 Video Playback

During the configuration and installation process, it may be necessary to verify the COM24 video streams in the absence of a Pro:Idiom enabled television.

The COM24 card can facilitate this type of debug activity by allowing the user to bypass the Pro:Idiom encryption process temporarily. It should be noted that this feature is only available when tuning to DIRECTV channel 100. Please refer to **Section 6.8.1** (“Security\_Mode” setting) for additional information on this feature.

If you wish to take advantage of this feature, you will need a video player on the PC that is capable of decoding MPEG video transferred via IP Packets. *VLC Media Player*, which is a free download, can decode MPEG video and can be found at the following URL: <http://www.videolan.org/vlc/>.

### 5.1.4 System Logging

The COM24 cards have the ability to send logging data to a remote destination. This is especially useful in situations where a management PC will remain with the COM1000 systems at all times, but it can also prove helpful when setting up and troubleshooting a system.

One simple solution is the syslog feature of the previously referenced *Tftpd32*, but it is limited in terms of features. A more feature-rich option might be considered for a more robust debugging capability. One alternative solution is an offering from Kiwi Enterprises (available at <http://www.kiwisyslog.com/>), but this option carries a licensing fee for a full version of the software, so it may not be a viable option for the casual user.

Furthermore, for software releases ST02.00.03 and above, each COM24 card provides a limited syslog capability. The cards are only capable of displaying 500 lines worth of log-data, so this may not be an appropriate tool for long-term system troubleshooting. However, the syslog feature can be quite useful if the system operator is able to access it within that window of time after a card begins to exhibit some unexpected behavior.

### 5.1.5 TFTP/FTP Server

The COM24 cards have the ability to transfer data to and from an external source via either an FTP (File Transfer Protocol) or a TFTP (Trivial File Transfer Protocol) server. The data transferred will typically take the form of software upgrades, but it is also possible to configure the system to log system status messages remotely for troubleshooting.

As mentioned previously, the multi-function tool *Tftpd32* is very effective at handling the file transfer needs for a log file or a software update to the COM24 card.

Because the COM1000 is field-upgradable, it is important that everyone working with the system in the field understands how to perform this function, so a brief overview of how to set up the TFTP server will be provided in **Section 5.3**.

### 5.1.6 IP Address Discovery

One potential complication inherent to interacting with the COM24 cards is that you must know the IP address of any card that you wish to interact with. In the case that you do know the IP address of the card you are trying to access, simply type the IP into your web browser's address bar. An alternative to typing a card's IP address directly into your web browser is to use an application designed by Technicolor specifically to combat this issue, called *COM24.exe*. Some PCs require that only one Ethernet cable be connected in order to reliably discover the cards. Technicolor will make this application available to anyone who wants it. An example can be seen in **Figure 11** below.



**Figure 11 – Results from the COM24 Discovery Tool**

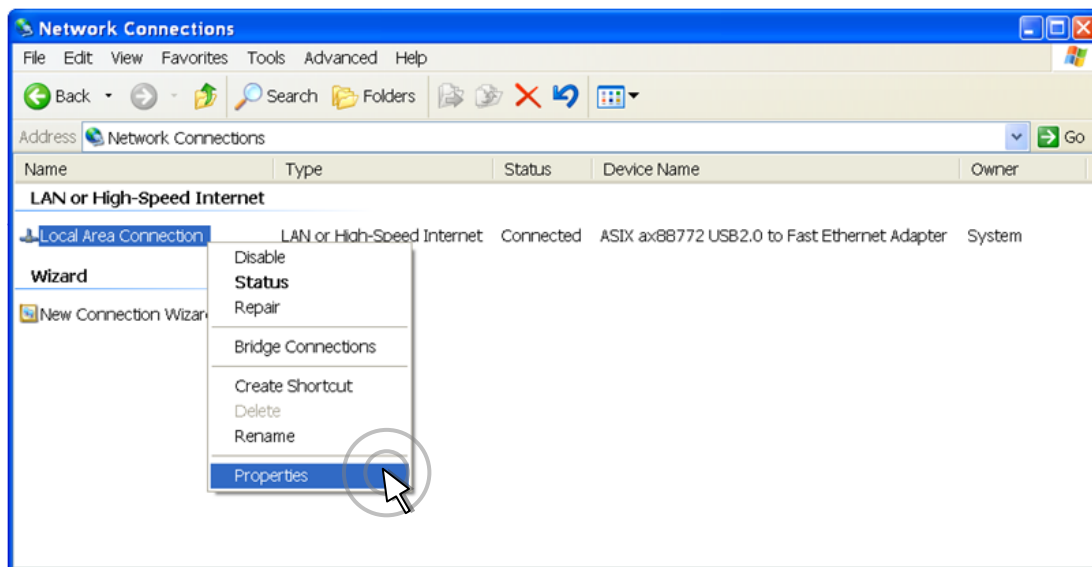


## 5.2 Connecting to the COM1000

### 5.2.1 Preparing Your Computer's Network Connections

As mentioned previously, interaction with the COM24 cards can only be achieved by providing a computer interface via one of the cards' Ethernet ports. However, this can only be achieved if the computer to be used for this purpose has been configured correctly. The directions below are intended to help you through this task step-by-step.

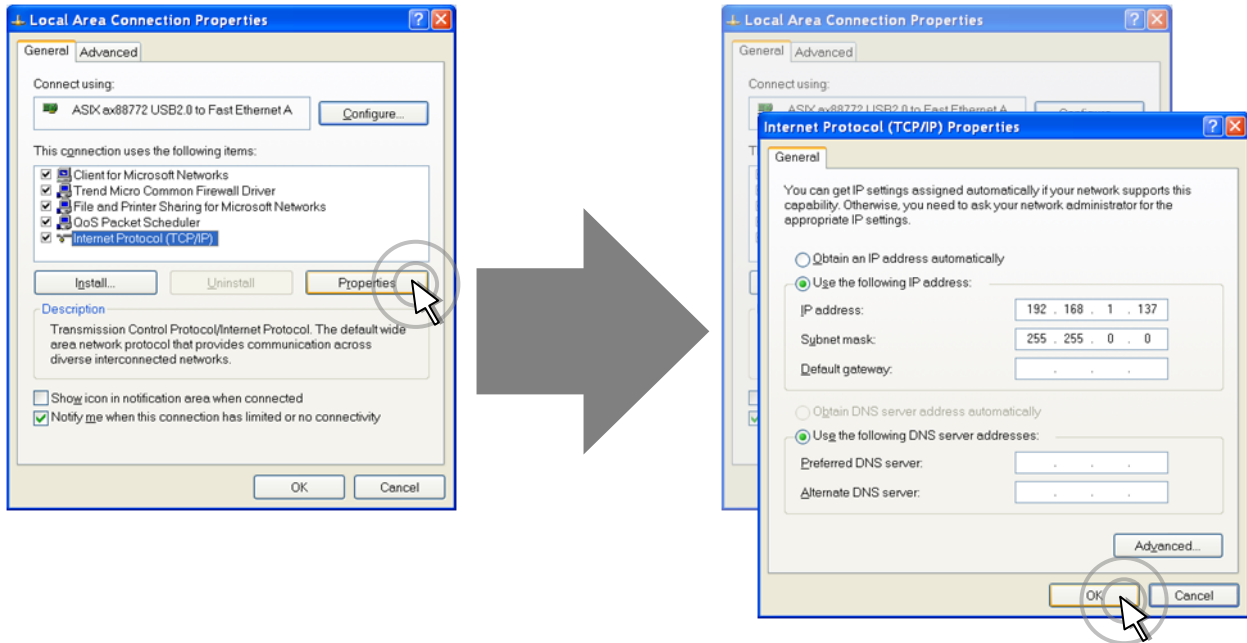
In order to locate the screen shown in **Figure 12** below, you will first need to open the *Control Panel*, typically located on the right-hand side of the Start Menu. Double-click on the icon labeled *Network Connections*.



**Figure 12 – Network Connections Window**

From there you will need to identify the network interface that will communicate with the COM24 cards. In this example, our system is utilizing the connection that is linked to the PC via an USB/Ethernet adapter. You will need to right-click the connection, and then select *Properties*.

At this point, you should have a window titled something similar to “Local Area Connection Properties”. From here, you will need to scroll through the list of available items and select the last one, “Internet Protocol (TCP/IP)” and click the *Properties* button (see **Figure 13**).



**Figure 13 – Internet Protocol Configuration**

In the window that you have just opened, you will see that there are two options available for defining an IP address for your PC. If your system has a DHCP server, you may select the first option, “*Obtain an IP address automatically.*” The benefit of this option is that it greatly minimizes the chances that you will have duplicate IP addresses in your network. One potential downfall of this choice, however, is that there is a chance that everything in your system could be assigned new IP addresses at the next reboot. Unless you are using something like the **COM24.exe** tool to resolve those addresses for you automatically, controlling the cards may prove difficult once this happens. Refer to **Section 5.1.6** above on how to resolve this issue.

If you wish to manually configure your network and ensure that you will never have to worry about IP addresses changing on you, however, then select the second option, “*Use the following IP address,*” taking care to assign a unique IP address to your PC. Also configure the subnet mask to 255.255.0.0. You may not know the cards’ IP addresses at this point, but it is very likely that they will be using the factory default range of 192.168.3.18 to 192.168.3.29, so any IP with the same prefix should work. If, for example, you select an address of 192.168.3.249 for your PC, you should generally be able to find the cards with a minimum of difficulty.

In addition, in order to successfully perform file transfers to your system (as required for software upgrades), it is recommended that you give your computer an IP address that is in the same subnet as your COM24 cards when using the manual configuration method. Configure subnet route to 255.255.0.0.

## 5.2.2 Avoiding IP Address conflicts

When building a system that is comprised of a mixture of cards from different sources, there is a possibility that some of the cards will have duplicate IP addresses, thereby making communication with these cards unreliable.

There are two recommendations for addressing this problem. The first is to use a DHCP server to ensure that each card gets a unique address. The second is to use the web interface on the COM24 cards to change the IP address of one of the duplicate cards (refer to **Section 6.8.1** for more information).

It should also be noted that, depending upon your computer's network configuration, attempting to access a property's wireless network at the same time you are accessing the COM24 cards could also give the undesirable result of not being able to navigate to your COM24 cards with the web browser. If you are suddenly unable to even see your COM24 cards in a system that was not previously exhibiting any IP address conflicts, you may wish to disable the wireless interface temporarily and see if that helps.

## 5.3 Using a TFTP Server

While you do have the option of using your choice of either FTP or TFTP to transfer data between the management PC and the COM1000 system, it is recommended that you use a TFTP program.

The reason is that TFTP is greatly simplified over FTP, the biggest difference being that it does not require user/password authentication, which are not necessary to access the COM1000 system in the first place.

*Note: This section will be describing procedures specific to the previously mentioned **Tftpd32**.*

### 5.3.1 Determining Your IP Address

In order to configure your TFTP server properly, you first need to know the IP address that your computer is using to communicate with the COM24 cards.

The following steps describe a fairly simple process that will be useful in determining where to send file transfers containing software upgrades (see **Section 7**) and also where to direct streaming video to test your system (see **Section 6.8.1**).

As seen in **Figure 14**, you will first need to access the Start Menu and select the "Run..." option. Type "cmd" in the small window that comes up and press the **OK** button.

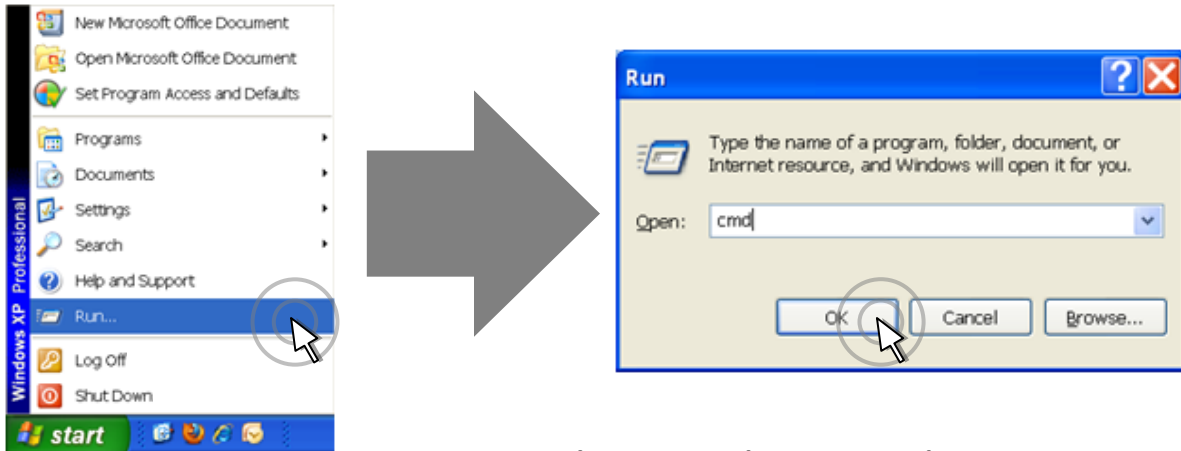


Figure 14 – Accessing the Command Prompt window

In the program window that appears, you will be prompted to enter a command. Type in “ipconfig” and press Enter (see **Figure 15** below).

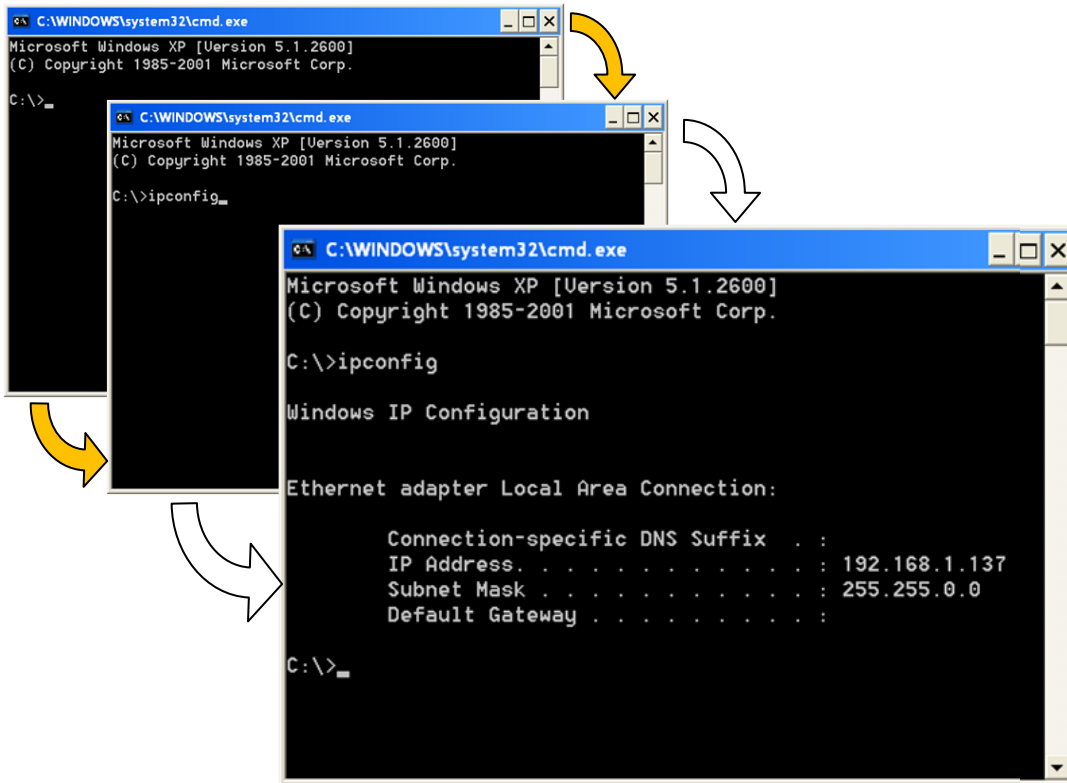


Figure 15 – Running ipconfig

In the example above, the computer is communicating with the COM1000 system over the “Local Area Connection” via an Ethernet adapter. In this case, the management PC has been assigned the IP address 192.168.1.137. This is the IP you will be using with the TFTP server and possibly later on with a program like *VLC Multimedia Player* (covered in **Sections 5.1.3** and **10.1.2**) when testing the system configuration.

### 5.3.2 Configuring Your TFTP Server

This section offers examples specific to the previously mentioned application *Tftpd32*. The primary function of this tool for most COM1000 systems will be to serve as a TFTP server to facilitate software upgrades.

The DHCP server may also be used if a particular installation needs that functionality, but you should be aware of the effect that it will have on the system, as there is a possibility that it could pass out new IP addresses to the COM24 cards every time one of them reboots.

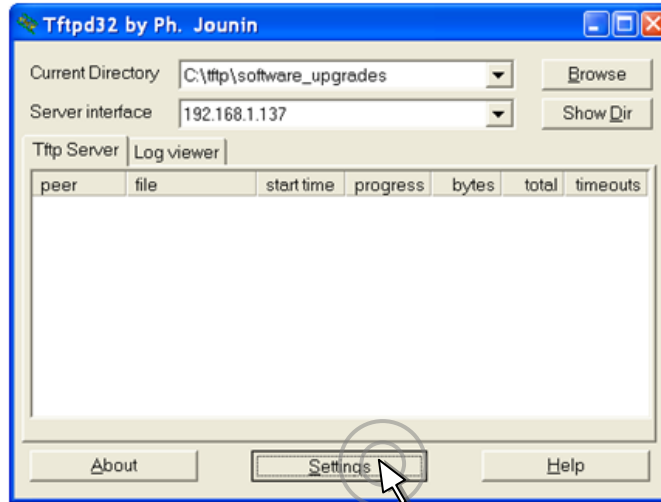
The syslog server may also be used, if desired, although the version offered here is not as feature-rich as the Kiwi syslog daemon discussed in the previous section.

*Tftpd32* has proven useful for performing file transfers to the COM24 cards, but some important limitations must be kept in mind when using it:

- A successful file transfer could be prevented by any third-party firewalls or anti-virus tools running on your computer, so you should disable them temporarily.
- You must be sure that your computer and the COM24 are on the same subnet (e.g. 192.168.3.xxx with subnet mask 255.255.0.0)
- Be sure to configure your TFTP server so that it points to the correct directory where the file is saved.
- The size of the file should be 10 MB or less.
- The COM24’s file-transfer mechanism has a limit of 200 total characters, so it is suggested that you save the file to a location with a short path (e.g. **C:\tftp\transfers**) instead of embedding it deep within the system.
- Also, be sure that the directory and file names contain no spaces, as these will not be recognized by the COM24’s file-transfer mechanism (Use **C:\tftp\software\_upgrades** rather than **C:\tftp\Software Upgrades**, for example)
- Be sure that the “Server Interface” field shows the IP address of your PC.

When you initially launch *Tftpd32*, you will see a screen similar to the one shown in **Figure 16**.

From here, you may fine-tune the settings by clicking the “Settings” button at the bottom of the screen.



**Figure 16 – Tftpd32 Startup Screen**

The window that comes up should look like the one below in **Figure 17**. At times, things like firewall setting and improper IP address configurations can interfere with the file transfers between your computer and the COM24 cards.

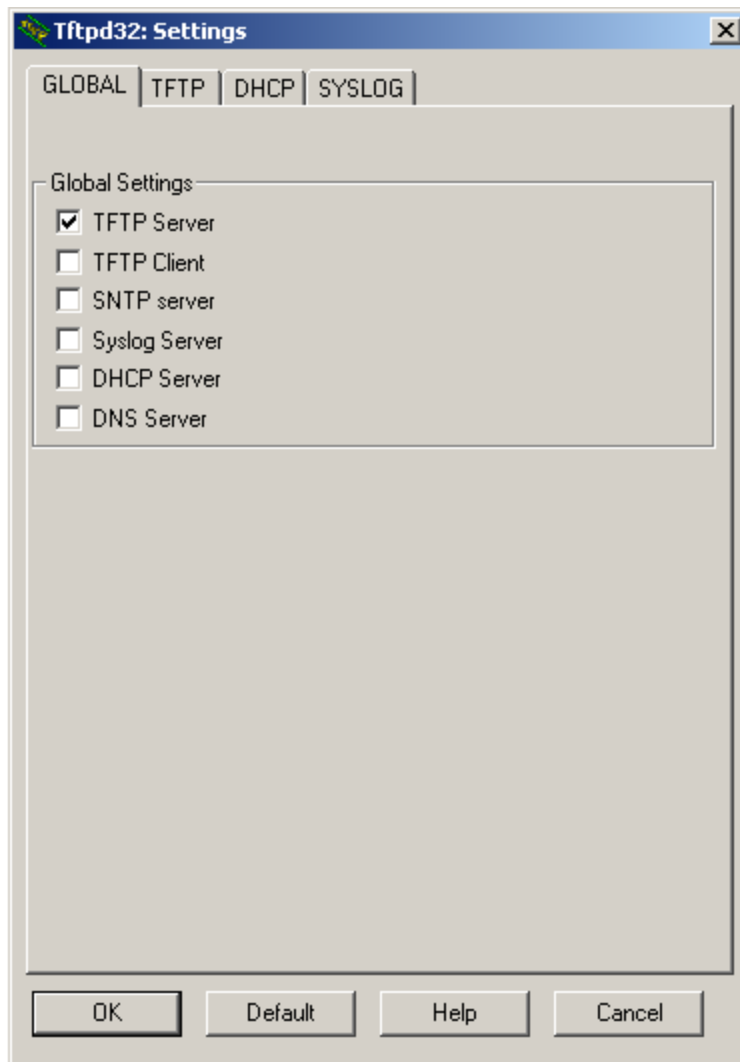


Figure 17 – *Tftpd32* Settings Window (Global Settings)

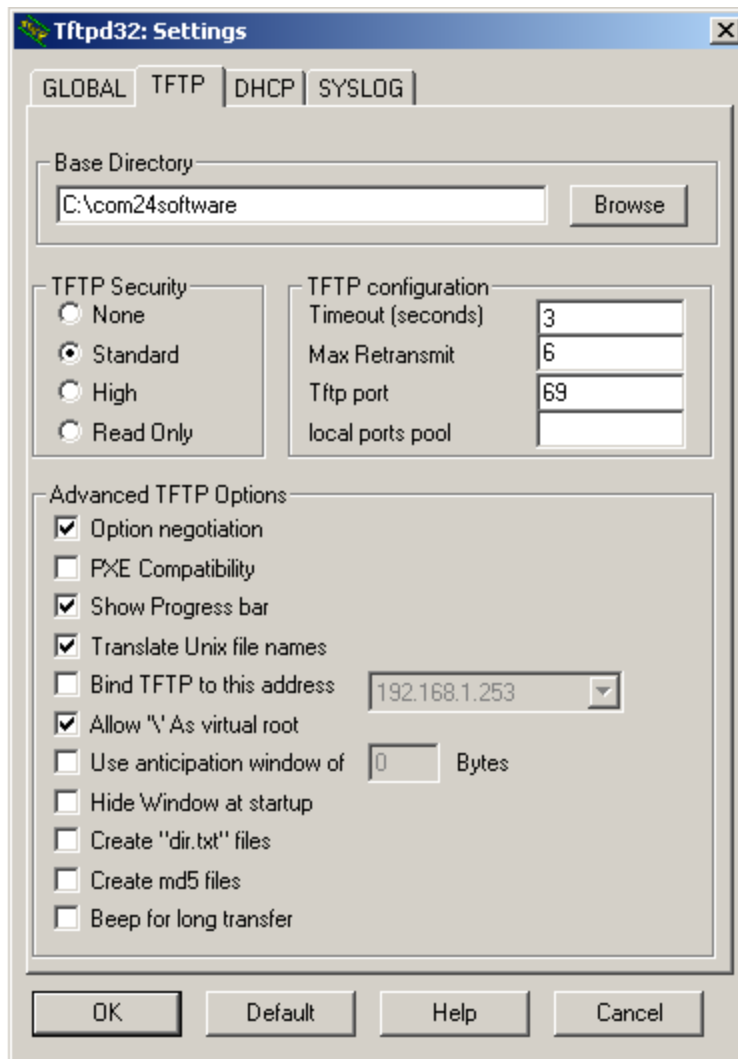
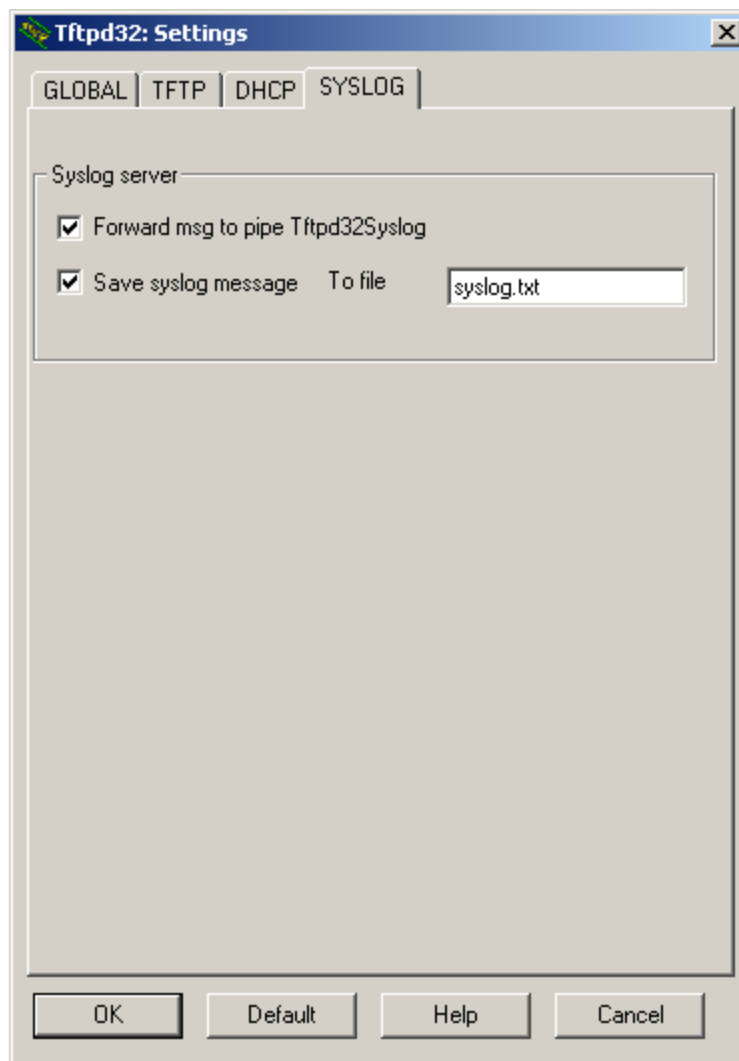


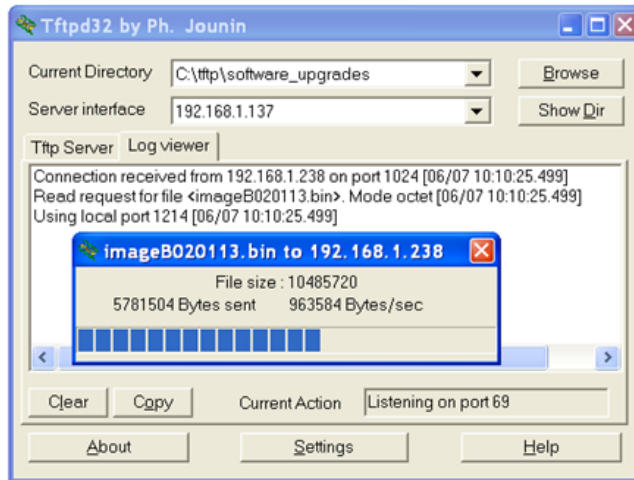
Figure 18 – Tftpd32 Settings Window (TFTP Settings)





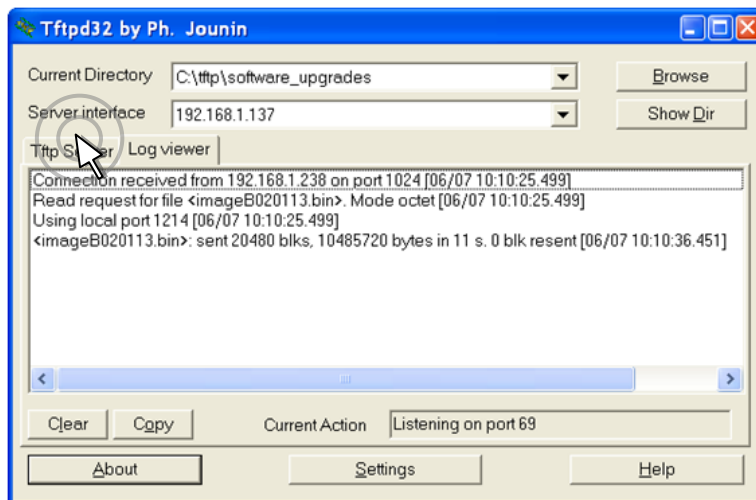
**Figure 19– Tftpd32 Settings Window (Syslog Settings)**

If you do not see a progress-bar (shown in **Figure 20**) within 30 seconds after hitting the **Submit Query** button on the upgrade page (see **Section 7** on upgrading your system), then the file transfer will not happen. In that case, it is advised that you review your setup.



**Figure 20 – Tftpd32 File Transfer Progress Screen**

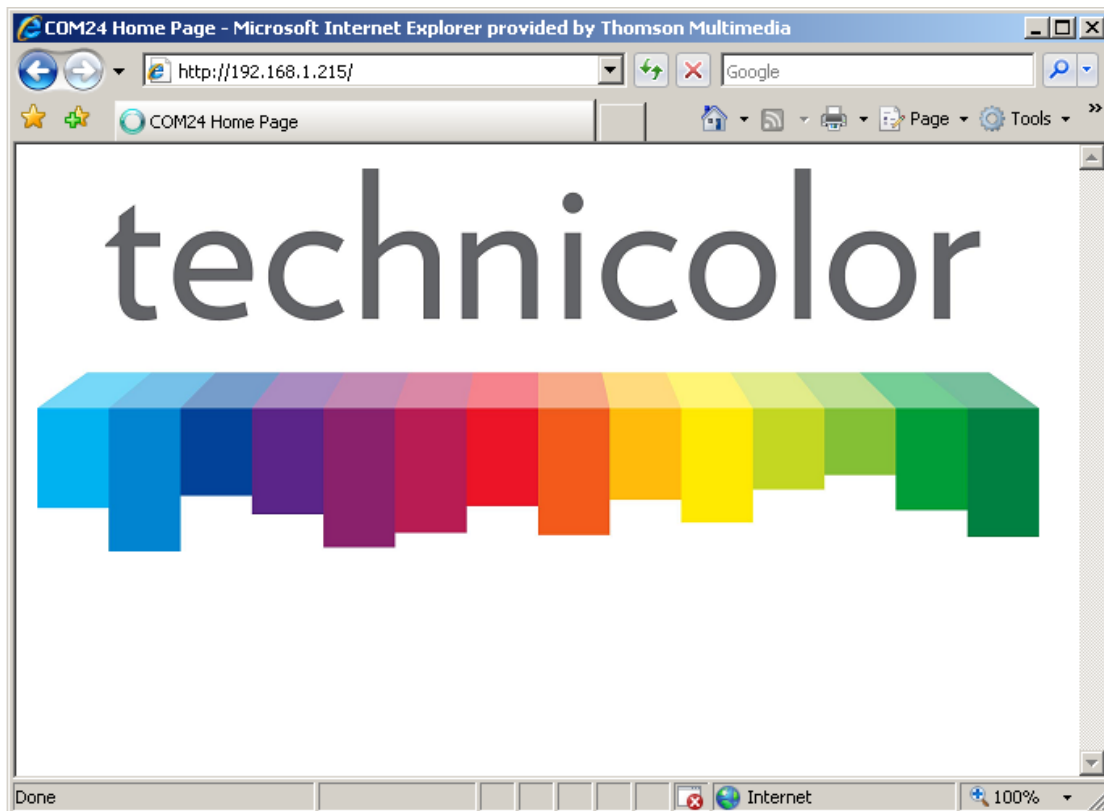
On rare occasions, the progress bar shown above in **Figure 20** will appear, but you will find that the requested file has not successfully transferred to the COM24 card. In order to get a better understanding of what happened, you should be sure to review the “Log Viewer” tab of the *Tftpd32* interface. If the file transferred successfully, you should see a statement similar to the last line shown in **Figure 21** for each file you attempted to upload.



**Figure 21 – Tftpd32 Completed Transfer Screen**

## 6 USING THE COM1000 WEB INTERFACE

Each COM24 card contains a basic web-based application that provides an easy means to control and configure the COM1000 system. This tool can be accessed by entering the IP address of one of the COM24 cards in the system into any web browser's address bar or by using the card discovery tool discussed in **Section 5.1.6**.



**Figure 22 - COM1000 Web Based User Interface Introduction Page**

The COM24 card issues a discovery call for all other COM24 cards in the system, and then populates a table with some basic information on current tuning parameters and RF signal levels. Once this information is complete, for version ST02.05.05 and later, the Discover Web Page illustrated in **Figure 22** is automatically displayed. For SW versions earlier than ST02.05.05, the Discover Web Page is reached by clicking the company logo on the Home Page.

### 6.1 Discovery of COM24 and COM24FLX Cards

**Figure 25** is the result obtained after the COM24 web interface's home page times out or by



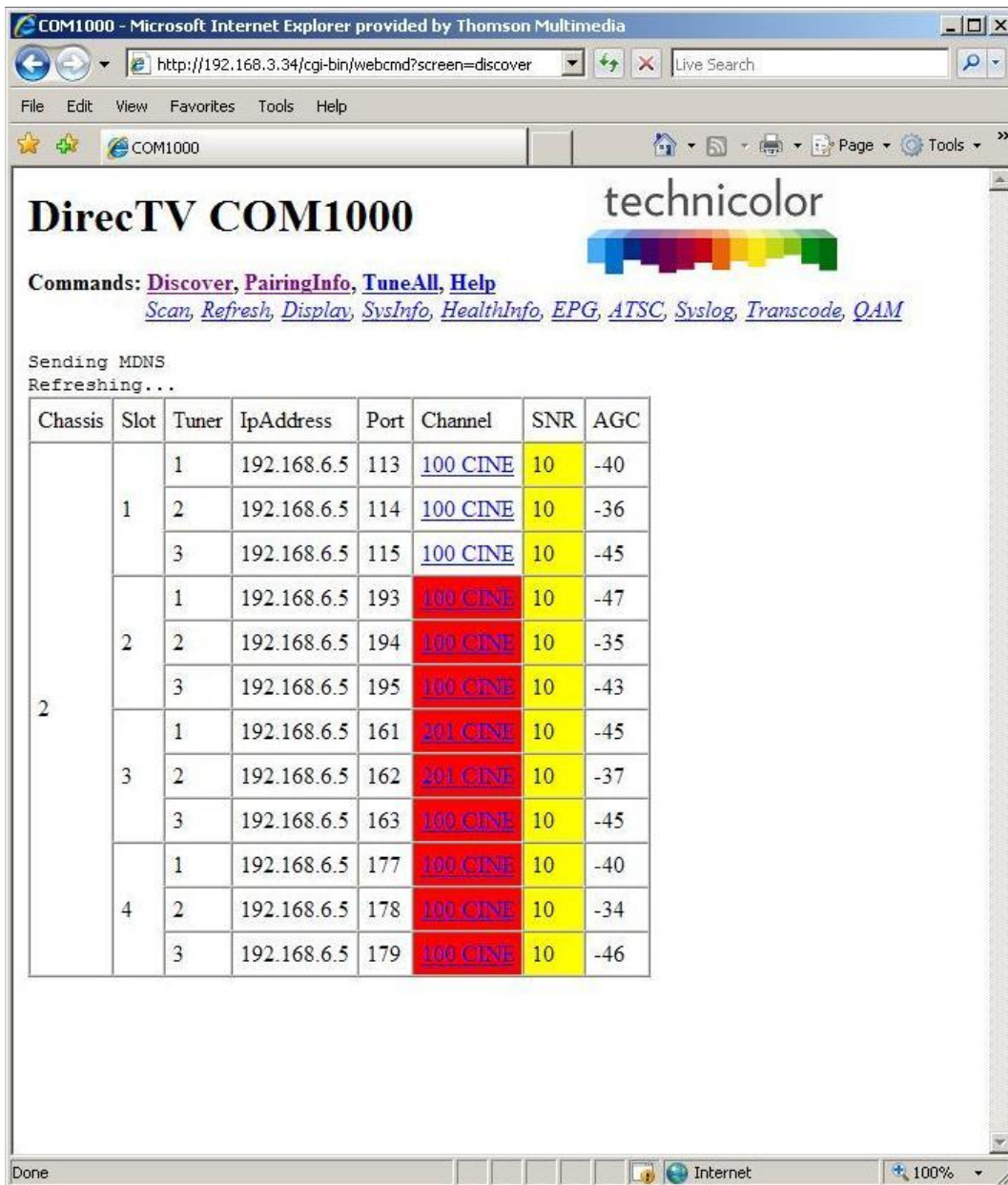
clicking the *Discover* link at the top of any other page<sup>1</sup>.

Chassis	Slot	Tuner	QAM	Bitrate	Channel	SNR	AGC
2	2	1	QAM 31-1	4.4 Mbps	<a href="#">202 CNNHD</a>	11	-36
		2	QAM 31-2	3.9 Mbps	<a href="#">206 ESPNHD</a>	12	-34
	3	1	QAM 32-1	2.2 Mbps	<a href="#">204 HLN</a>	14	-43
		2	QAM 32-2	4.0 Mbps	<a href="#">272 LOGO</a>	10	-36
	4	1	QAM 33-1	3.8 Mbps	<a href="#">248 FXHD</a>	10	-44
		2	QAM 33-2	1.7 Mbps	<a href="#">271 H2</a>	12	-32
	5	1	QAM 34-1	4.5 Mbps	<a href="#">244 SvfvHD</a>	10	-41
		2	QAM 34-2	5.0 Mbps	<a href="#">242 USAHD</a>	12	-31
	6	1	QAM 35-1	8.0 Mbps	<a href="#">236 E!HD</a>	8	-55
		2	QAM 35-2	3.0 Mbps	<a href="#">287 MILT</a>	13	-34
	7	1	QAM 36-1	5.0 Mbps	<a href="#">242 USAHD</a>	11	-63
		2	QAM 36-2	13.9 Mbps	<a href="#">245 TNTHD</a>	12	-38
	8	1	QAM 37-1	2.9 Mbps	<a href="#">269 HISTHD</a>	8	-52
		2	QAM 37-2	8.7 Mbps	<a href="#">241 SpikeHD</a>	10	-45
	9	1	QAM 38-1	3.3 Mbps	<a href="#">296 CNeHD</a>	12	-36
		2	QAM 38-2	6.2 Mbps	<a href="#">329 BETHD</a>	11	-34
	10	1	QAM 39-1	3.8 Mbps	<a href="#">248 FXHD</a>	10	-47
		2	QAM 39-2	10.7 Mbps	<a href="#">216 NBAHD</a>	12	-29

Figure 23 - COM24 Discover Page

Figure 25 shows a basic data summary that is also similar to the pages you will get by clicking on the *Scan*, *Refresh*, or *Display* hyperlinks at the top of any COM1000 web interface page. The differences will be discussed in later sections. Figure 24 shows the Discover page for systems containing COM24FLX cards. Note that the slots containing COM24FLX cards (in SD mode) will contain entries for three tuners instead of two.

<sup>1</sup> Prior to ST02.05.05, the company logo needed to be clicked to transition from to .



COM1000 - Microsoft Internet Explorer provided by Thomson Multimedia

http://192.168.3.34/cgi-bin/webcmd?screen=discover

# DirecTV COM1000

technicolor

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [ATSC](#), [Syslog](#), [Transcode](#), [QAM](#)

Sending MDNS  
 Refreshing...

Chassis	Slot	Tuner	IpAddress	Port	Channel	SNR	AGC
2	1	1	192.168.6.5	113	100 CINE	10	-40
		2	192.168.6.5	114	100 CINE	10	-36
		3	192.168.6.5	115	100 CINE	10	-45
	2	1	192.168.6.5	193	100 CINE	10	-47
		2	192.168.6.5	194	100 CINE	10	-35
		3	192.168.6.5	195	100 CINE	10	-43
	3	1	192.168.6.5	161	201 CINE	10	-45
		2	192.168.6.5	162	201 CINE	10	-37
		3	192.168.6.5	163	100 CINE	10	-45
	4	1	192.168.6.5	177	100 CINE	10	-40
		2	192.168.6.5	178	100 CINE	10	-34
		3	192.168.6.5	179	100 CINE	10	-46

Figure 24 - Discover Page w. COM24FLX



There are several changes from the old discovery page to this new one:

- Color coded problem areas have been added
- Network name and channel are now both displayed
- “Clickable” channel name results in tune
- Card IP address no longer shown
- RF output channel and subchannel if directed to internal QAM24 port are shown
- Destination IP address and IP port if directed to an external device is shown
- Program bit rate if directed to an internal QAM24 port (static snapshot)
- Clickable Slot\_ID link shows CAM log if there are authorization problems


Issues for some of the tuners are shown color coded in **Figure 25** below.

COM1000 - Microsoft Internet Explorer provided by Thomson Multimedia

http://192.168.3.36/cgi-bin/webcmd?screen=discover

File Edit View Favorites Tools Help

COM1000

**DirecTV COM1000** 

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Syslog](#), [ATSC](#), [401](#), [QAM](#)

Sending MDNS  
Refreshing...

Chassis	Slot	Tuner	QAM	Bitrate	Channel	SNR	AGC
2	3	1	QAM 32-1	1.3 Mbps	<a href="#">204 HLN</a>	14	-41
		2	QAM 32-2	3.1 Mbps	<a href="#">272 LOGO</a>	10	-36
	4	1	QAM 33-1	3.2 Mbps	<a href="#">248 FXHD</a>	7	-59
		2	QAM 33-2	2.7 Mbps	<a href="#">271 H2</a>	12	-34
	5	1	QAM 34-1	5.9 Mbps	<a href="#">244 SrvHD</a>	9	-41
		2	QAM 34-2	4.2 Mbps	<a href="#">242 USAHD</a>	12	-38
	6	1	QAM 35-1	3.4 Mbps	<a href="#">236 E1HD</a>	13	-40
		2	QAM 35-2	4.4 Mbps	<a href="#">287 MILT</a>	13	-34
	7	1	QAM 36-1	4.2 Mbps	<a href="#">242 USAHD</a>	7	-71
		2	QAM 36-2	9.7 Mbps	<a href="#">245 TNTHD</a>	9	-41
	8	1	QAM 37-1	7.1 Mbps	<a href="#">269 HISTHD</a>	11	-37
		2	QAM 37-2	9.4 Mbps	<a href="#">241 SpikeHD</a>	8	-47
	9	1	QAM 38-1	8.2 Mbps	<a href="#">296 CNeHD</a>	12	-44
		2	QAM 38-2	7.9 Mbps	<a href="#">329 BETHD</a>	10	-47
	10	1	QAM 39-1	7.6 Mbps	<a href="#">610 BTNHD</a>	10	-53
		2	QAM 39-2	6.8 Mbps	<a href="#">212 NFLHD</a>	8	-41
	11	1	QAM 40-1	6.9 Mbps	<a href="#">530 SBLKHD</a>	10	-46
		2	QAM 40-2	9.1 Mbps	<a href="#">500 AUDHD</a>	12	-33
	12	1	QAM 41-1	7.2 Mbps	<a href="#">504 HBOwHD</a>	10	-57
		2	QAM 41-2	6.8 Mbps	<a href="#">530 SBLKHD</a>	11	-39

**Figure 25 – COM1000 Discover Page (showing colors)**

The following is a detailed list of the information found on these pages.

### 6.1.1 Fields prior to ST02.05.05 no longer present

**Edit** – Clicking the *Tune* hyperlink is the method by which you access the “Channel Tune” interface of the COM24 cards (covered in **Section 6.8.1**). Each tuner in the system is independently controllable (two per card). (Field removed in ST02.05.05.)

**CardIP** – This field shows the IP address of the COM24 card that resides in the chassis and slot combination to its left. (Field removed in ST02.05.05.)

### 6.1.2 Fields present after ST02.05.05

**Chassis** – This field reports a unique identifier for the chassis. In systems that contain multiple chassis, this can be used to identify each card in the system. See **Section 4.1** on how to assign unique identifiers to multiple chassis within a system.

**Slot** – This field identifies the card’s location within a chassis, numbered 1 through 12. If this field is grey, the slot number is a link to messages in the CAM Log.

**Tuner** – There are two entries per CardIP for this column. This represents the two tuners available on each COM24 card. Version ST02.05.05 changed the tuner numbers to start at one instead of zero to match the card’s faceplate.

**QAM or IPAddress** – Prior to SW version ST02.05.05, this column header was “IPAddress.” In SW version ST02.05.05 and later, if some of the programs are streaming to a QAM24, then “QAM” is displayed as the column header. If all signals are routed out of the system, then “IPAddress” will display as the column header instead. In SW version ST02.05.05 or later, if the card is sending video to a QAM24, this field shows the output QAM frequency and QAM sub-channel number. If a card is streaming video to outside of the chassis, this field will contain the destination IP address. Typically, this will be the IP address of an external edge QAM. Both unicast and multicast addresses are supported. However, older COM200 Chassis (pseudo codes BC004 and NC004) require that multicast streams be sent out the front port and an external Ethernet switch be used. Newer COM200 chassis route multicast traffic only to the two gigabit Ethernet ports (the QAM24 slot and slot 1).

**Bitrate or Port** – Prior to SW version ST02.05.05, this column header was “Port.” . In SW version ST02.05.05 and later, if some of the programs are streaming to a QAM24, then “Bitrate” is displayed as the column header. If all signals are routed out of the system, then “Port” will display as the column header instead. In SW version ST02.05.05 or later, if the card is sending video to a QAM24, this field shows the instantaneous bitrate of the channels being sent out of the QAM24. Otherwise this field contains the destination port associated with the destination IP address described above. You must have a unique port number for each individual channel you

wish to stream.

**Channel** – This field shows the Channel Name and the DIRECTV channel number you tune to on a typical DIRECTV tuner. This field is also a link that permits the user to change channels. If the smart card has not been authorized or paired then the channel will be highlighted in red.

**SNR** – This field returns the Signal-to-Noise Ratio associated with the selected tuners. In ST02.05.05, if the SNR is low, it will be highlighted in yellow and if the SNR is very low, it will be highlighted in red.

*Note: For optimum performance of the COM200, this value should be 11 or higher.*

**AGC<sup>2</sup>** – This value provides a value corresponding to the internal Automatic Gain Control setting in the COM24. In ST02.05.05 and later, if the AGC is low, it will be highlighted in yellow and if the AGC is very low, it will be highlighted in red.

*Note: For optimum performance of the COM200, this value should be somewhere between -25 and -55.*

---

<sup>2</sup> Although named AGC, this value is essentially the power level at the input of the COM24 card.





## 6.2 Scanning for COM24 Cards

Using the *Scan* link is not recommended. **Figure 26** below is the result obtained by clicking the *Scan* link at the top of any COM1000 web interface page. You may suppress the status messages at the top by the clicking the *Display* link.

It should be noted that the more chassis a property has, the longer the *Scan* command will take. There are cases where the scan can take an hour or more. As a result, the *Discover* command is a better choice in nearly all cases, unless you have found that it does not work for you.

The *Scan* operation is limited in its capabilities. The COM24 card will scan through four full subnets including and following the current one, looking for other COM24 cards. For example, if the card's IP is 192.168.3.100, it will scan for cards in the range of 192.168.3.1 through 192.168.6.254. If your network topology is such that the IP Addresses of your COM24 cards lie outside of this range, the *Scan* command will not return any data.



**DirecTV COM1000**

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Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Syslog](#), [ATSC](#), [401](#), [QAM](#)

```
pinger 192.168.1.0 192.168.4.0
Found 192.168.1.250
Found 192.168.3.35
Found 192.168.3.36
Found 192.168.3.37
Found 192.168.3.38
Found 192.168.3.39
Found 192.168.3.40
Found 192.168.3.41
Found 192.168.3.43
Found 192.168.3.44
Found 192.168.3.45
Found 192.168.3.42
```

Chassis	Slot	Tuner	IpAddress	Port	Channel	SNR	AGC
		1	0.0.0.0	0	0	0	0
		2	0.0.0.0	0	0	0	0
		3	0.0.0.0	0	0	0	0
		1	0.0.0.0	0	0	0	0
		2	0.0.0.0	0	0	0	0
		3	0.0.0.0	0	0	0	0
		1	0.0.0.0	0	0	0	0
		2	0.0.0.0	0	0	0	0
		3	0.0.0.0	0	0	0	0
		1	0.0.0.0	0	0	0	0
		2	0.0.0.0	0	0	0	0
		3	0.0.0.0	0	0	0	0
		1	0.0.0.0	0	0	0	0

Figure 26 – COM1000 Scan Page

The *Scan* function displays a limited amount of information in the same format as was covered in **Section 6.1**. It primarily displays all IPs found within an area in numerical order. The information can be resolved into a more useable format (i.e. COM24 card information only) by clicking the *Refresh* link.

### 6.3 Refreshing the COM1000 Display

**Figure 27** below is the result obtained by clicking the *Refresh* link at the top of any COM1000 web interface page. Please note that this table is filled in with data obtained during execution of either the *Discover* or *Scan* commands, so if it appears to be empty, simply perform one of these operations first and then come back to this screen.



**DirectV COM1000**

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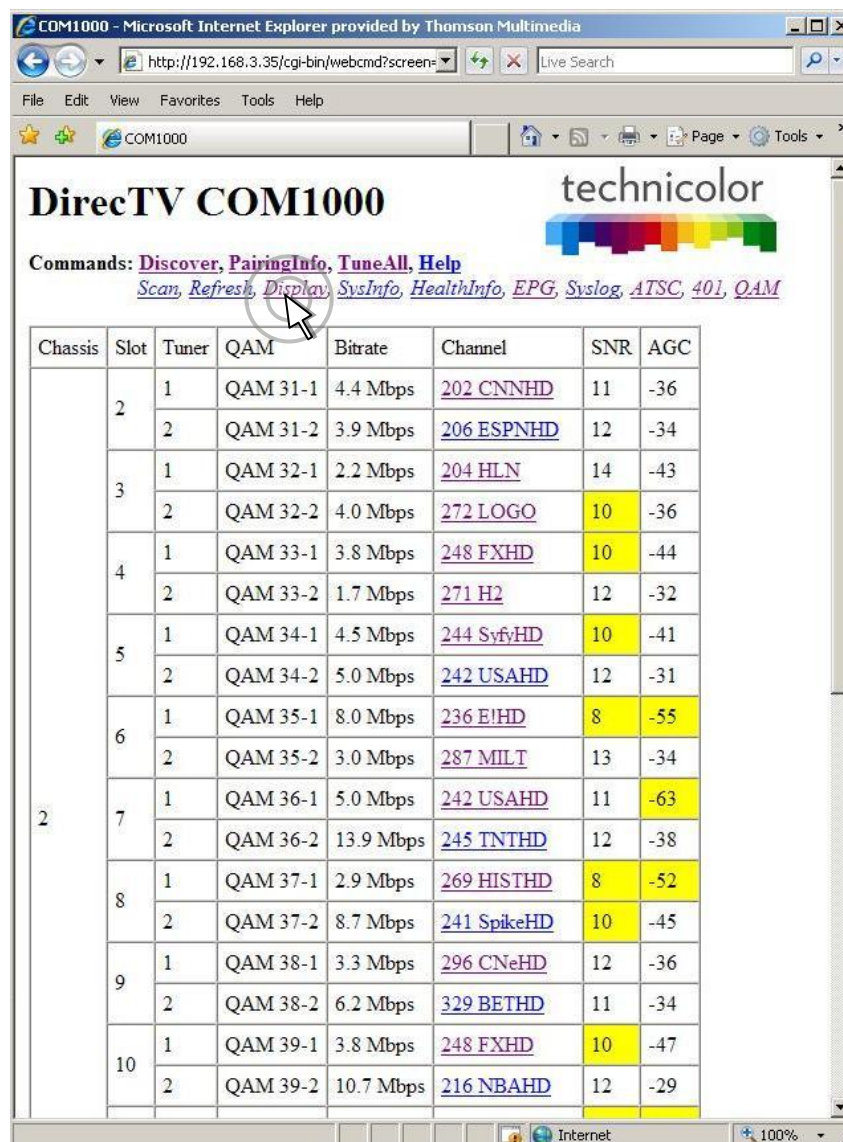
Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Syslog](#), [ATSC](#), [40i](#), [QAM](#)

Chassis	Slot	Tuner	QAM	Bitrate	Channel	SNR	AGC
2	2	1	QAM 31-1	4.4 Mbps	<a href="#">202 CNNHD</a>	11	-36
		2	QAM 31-2	3.9 Mbps	<a href="#">206 ESPNHD</a>	12	-34
	3	1	QAM 32-1	2.2 Mbps	<a href="#">204 HLN</a>	14	-43
		2	QAM 32-2	4.0 Mbps	<a href="#">272 LOGO</a>	10	-36
	4	1	QAM 33-1	3.8 Mbps	<a href="#">248 FXHD</a>	10	-44
		2	QAM 33-2	1.7 Mbps	<a href="#">271 H2</a>	12	-32
	5	1	QAM 34-1	4.5 Mbps	<a href="#">244 SvyfHD</a>	10	-41
		2	QAM 34-2	5.0 Mbps	<a href="#">242 USAHD</a>	12	-31
	6	1	QAM 35-1	8.0 Mbps	<a href="#">236 E!HD</a>	8	-55
		2	QAM 35-2	3.0 Mbps	<a href="#">287 MILT</a>	13	-34
	7	1	QAM 36-1	5.0 Mbps	<a href="#">242 USAHD</a>	11	-63
		2	QAM 36-2	13.9 Mbps	<a href="#">245 TNTHD</a>	12	-38
	8	1	QAM 37-1	2.9 Mbps	<a href="#">269 HISTHD</a>	8	-52
		2	QAM 37-2	8.7 Mbps	<a href="#">241 SpikeHD</a>	10	-45
	9	1	QAM 38-1	3.3 Mbps	<a href="#">296 CNeHD</a>	12	-36
		2	QAM 38-2	6.2 Mbps	<a href="#">329 BETHD</a>	11	-34
	10	1	QAM 39-1	3.8 Mbps	<a href="#">248 FXHD</a>	10	-47
		2	QAM 39-2	10.7 Mbps	<a href="#">216 NBAHD</a>	12	-29

Figure 27 – COM1000 Refresh Page

## 6.4 Displaying COM1000 Status

By clicking the *Display* hyperlink at the top of any COM1000 web interface page, you can see the information last obtained from a *Discover* or *Refresh* with the signal status of all cards in the system as shown in **Figure 28** below.



Chassis	Slot	Tuner	QAM	Bitrate	Channel	SNR	AGC
2	2	1	QAM 31-1	4.4 Mbps	<a href="#">202 CNNHD</a>	11	-36
		2	QAM 31-2	3.9 Mbps	<a href="#">206 ESPNHD</a>	12	-34
	3	1	QAM 32-1	2.2 Mbps	<a href="#">204 HLN</a>	14	-43
		2	QAM 32-2	4.0 Mbps	<a href="#">272 LOGO</a>	10	-36
	4	1	QAM 33-1	3.8 Mbps	<a href="#">248 FXHD</a>	10	-44
		2	QAM 33-2	1.7 Mbps	<a href="#">271 H2</a>	12	-32
	5	1	QAM 34-1	4.5 Mbps	<a href="#">244 SvfHD</a>	10	-41
		2	QAM 34-2	5.0 Mbps	<a href="#">242 USAHD</a>	12	-31
	6	1	QAM 35-1	8.0 Mbps	<a href="#">236 E!HD</a>	8	-55
		2	QAM 35-2	3.0 Mbps	<a href="#">287 MILT</a>	13	-34
	7	1	QAM 36-1	5.0 Mbps	<a href="#">242 USAHD</a>	11	-63
		2	QAM 36-2	13.9 Mbps	<a href="#">245 TNTHD</a>	12	-38
	8	1	QAM 37-1	2.9 Mbps	<a href="#">269 HISTHD</a>	8	-52
		2	QAM 37-2	8.7 Mbps	<a href="#">241 SpikeHD</a>	10	-45
	9	1	QAM 38-1	3.3 Mbps	<a href="#">296 CNeHD</a>	12	-36
		2	QAM 38-2	6.2 Mbps	<a href="#">329 BETHD</a>	11	-34
	10	1	QAM 39-1	3.8 Mbps	<a href="#">248 FXHD</a>	10	-47
		2	QAM 39-2	10.7 Mbps	<a href="#">216 NBAHD</a>	12	-29

**Figure 28 – COM1000 Display Page**

When used in conjunction with the *Scan* and *Refresh* commands, it simply filters the table so that all discovered COM24 cards are shown at the top of the table and removes any system status messages that may appear when running the previously covered functions.



## 6.5 Evaluating COM24 Authorization Status

By clicking the *PairingInfo* hyperlink at the top of any COM1000 web interface page, you can quickly evaluate the authorization status of all cards in the system as shown in **Figure 29** below. For details on how to obtain more in-depth information on this topic, please refer to **Section 7**.

This page also provides direct access to a card’s internal syslog and CAM log and the ability to upgrade multiple cards. These can be reached by clicking the hyperlinks that represent the card’s IP address and CAM\_ID, as can be seen below.

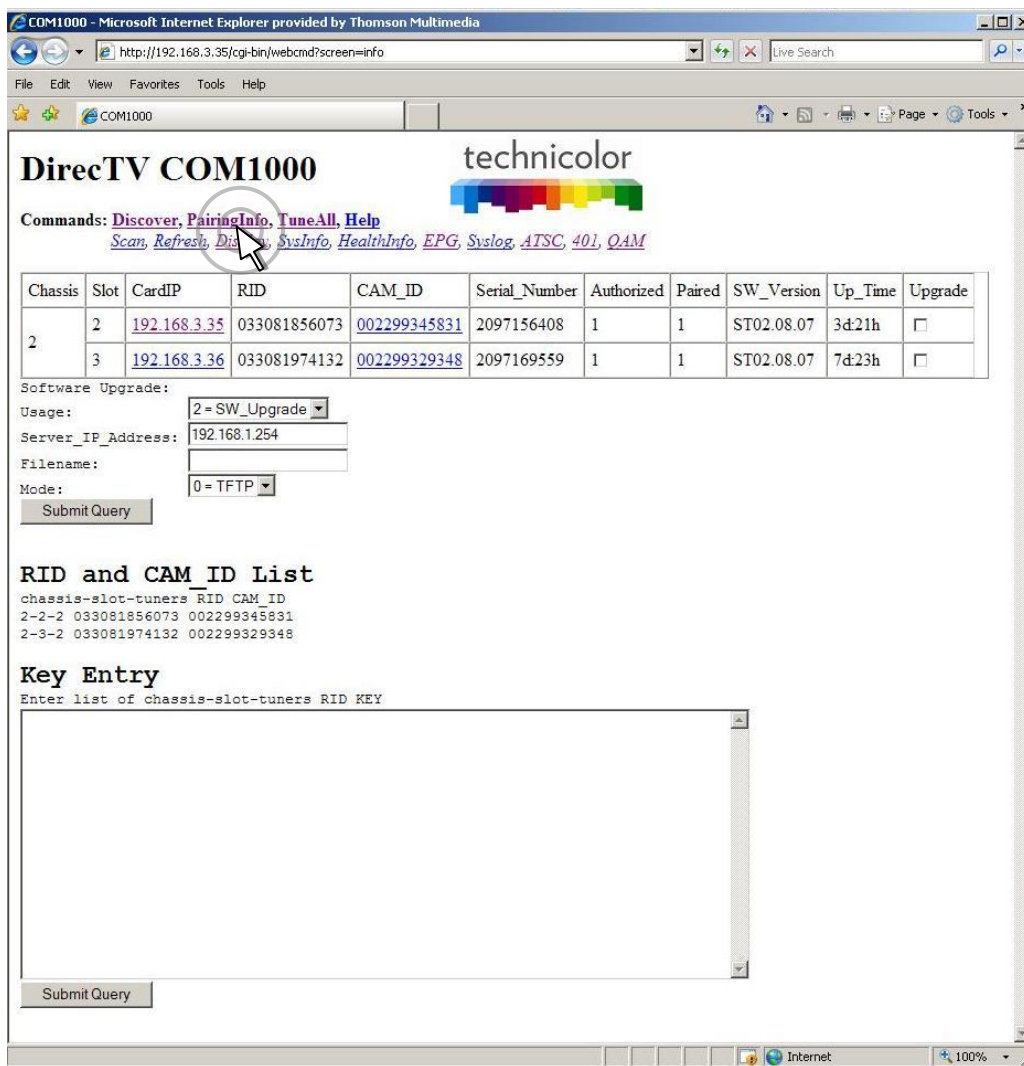


Figure 29 – COM1000 Pairing Info Page

Following is a detailed list of information available on the *PairingInfo* page.

**Chassis** – This field reports a unique identifier for the chassis. In systems that contain multiple chassis, this can be used to identify each card in the system. See **Section 4.1** on how to assign unique identifiers to multiple chassis within a system.

**Slot** – This field identifies the card’s location within a chassis, numbered 1 through 12.

**CardIP** – This field shows the IP address of the COM24 card that resides in the chassis and slot combination to its left. This field is also a link to see the Syslog for that card.

**RID** – This field reports the DIRECTV Receiver ID, or RID. This value is the first of two parameters required to obtain authorization on the DIRECTV network.

**CAM\_ID** – This field reports the DIRECTV CAM ID. This value is the second parameter required to obtain authorization on the DIRECTV network. For any card running a software version above ST02.00.09, you can click on the hyperlink in this column to be taken directly to that card’s CAM Log (see **Section 6.8.7** for more information on reading a card’s CAM log).

**Authorized** – This field reports whether the COM24 card’s CAM has been authorized. A value of ‘1’ indicates that the card has been authorized, thereby enabling the card to receive DIRECTV programming. A value of ‘0’ indicates that the card has not been authorized.

**Paired** – This field reports the pairing status of the CAM card. In order to be capable of receiving an authorization to the DIRECTV network, the RID and CAM data must first be paired. If this has not happened, then the card cannot be authorized until the pairing is resolved. A value of ‘1’ indicates that the RID and CAM are successfully paired; a value of ‘0’ indicates that they are not.

*Note: Refer to **Section 10.4** for more information if you notice a card that has a value of ‘1’ under both the “Authorized” and “Paired” columns but is not streaming video properly.*

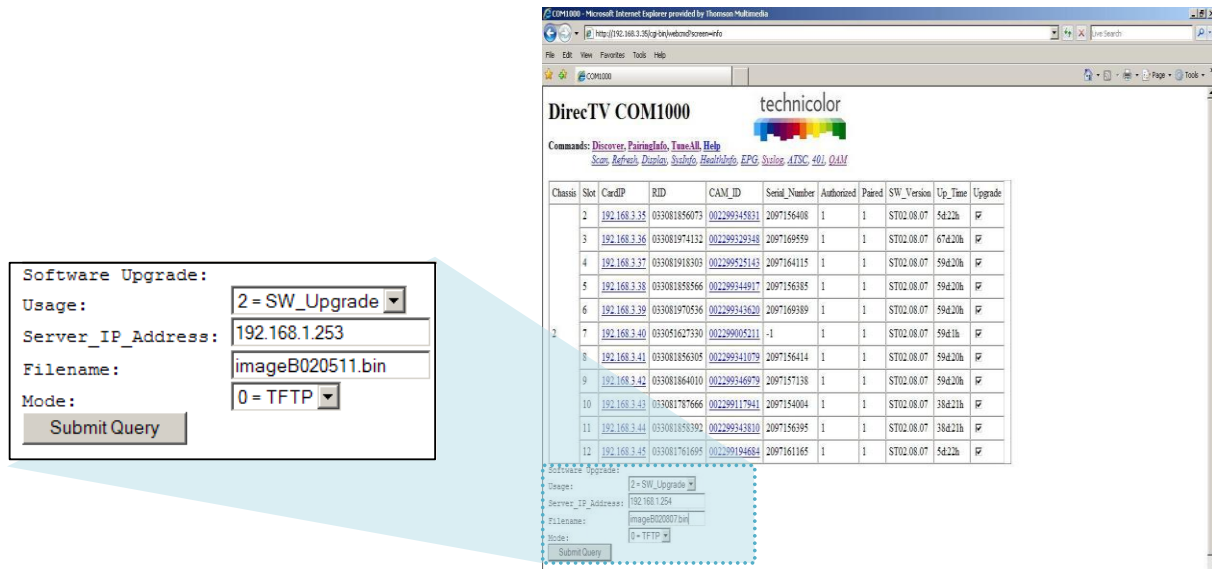
**SW\_Version** – This field reports the software version that currently resides on the COM24 card. All cards that have a similar web interface to the one described in this document will have a version number of at least ST01.00.25. The examples given have been taken from cards that are running the ST02.05.11 software release.

**Up\_Time** – This field gives an indication of how much time has elapsed since the card was last rebooted or powered up.

**Upgrade** – By checking this box for a particular card, you will make each of the fields at the bottom of the screen active for that card. This allows you to upgrade multiple cards at a time.

**Software Upgrade** –The fields in this section are covered on the next page.

**Figure 30** below shows in detail the upgrade section available on the *PairingInfo* page.



**Figure 30 – COM24 Multi-card Upgrade Feature**

Following is a brief description of the relevant fields on this page.

**Upgrade** – By checking this box for a particular card, you will make each of the fields under “Software Upgrade” heading active for that card. This method is more efficient in that it allows you to update multiple cards to the latest software in one easy step.

**Usage** – This field allows you to select which type of file transfer you wish to undertake for a particular card. The available options are shown below. It should be noted that when selecting any option other than ‘2’, the card will appear to go through the usual software update cycle, but that it will revert to the current build of code once it has rebooted.

*0 = Set\_Log\_IP* – This option allows you to identify the IP address to which you wish to send COM24 logging for monitoring by a syslog utility.

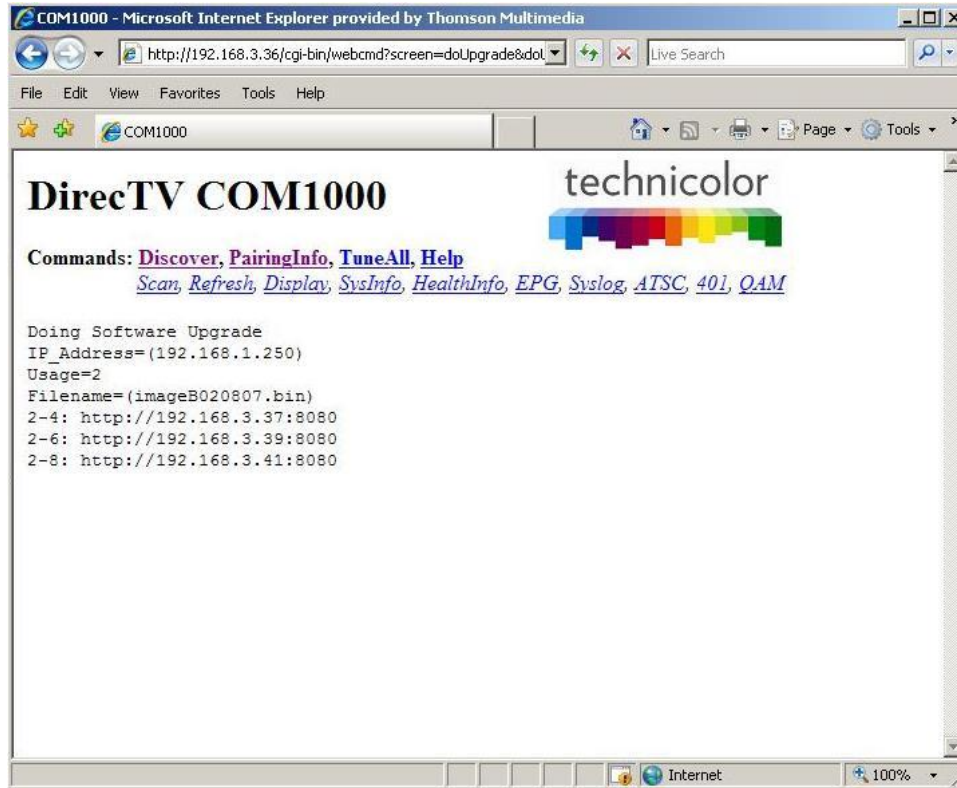
*1 = NA* – This option is not available to new users and only exists in order to support backward-compatibility with older builds of code.

*2 = SW\_Upgrade* – This is the only user-accessible means of updating the software in a COM24 card.

*3 = Log* – This option allows you to copy a COM24 card’s internal log files to a PC.



*Note: Options 4 through 7 are not available to users and are for development purposes only.*



**Figure 31 – COM24 Multi-card Upgrade Results Page**

**See Section 7 for more information on upgrading your system.**

## 6.6 Evaluating COM1000 System Status

By clicking the *SysInfo* hyperlink at the top of any COM1000 web interface page, you will access the page shown below in **Figure 32**. This table gives you the ability to select from one of a number of different unique identifiers for every COM24 card if your system needs such capability.

**DirecTV COM1000**

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Syslog](#), [ATSC](#), [401](#), [QAM](#)

Chassis	Slot	CardIP	System_Integrator_ID	Property_ID	MAC_Address
2	2	192.168.3.35		:EPG	00:26:24:18:0f30
2	3	192.168.3.36			00:26:24:39:88:44
2	4	192.168.3.37			00:26:24:39:63:e6
2	5	192.168.3.38			00:26:24:18:0f02
2	6	192.168.3.39			00:26:24:39:88:18
2	8	192.168.3.41			00:26:24:18:0f3c
2	9	192.168.3.42			00:26:24:18:14:e4
2	10	192.168.3.43			00:19:dff7:e9:16
2	11	192.168.3.44			00:26:24:18:0f16
2	12	192.168.3.45			00:26:24:39:4c:da

Figure 32 – COM1000 SysInfo Page

Following is a detailed list of the information available on the *SysInfo* (System Info) page.

**Chassis** – This field reports a unique identifier for the chassis. In systems that contain multiple chassis, this can be used to identify each card in the system. See **Section 4.1** on how to assign unique identifiers to multiple chassis within a system.

**Slot** – This field identifies the card’s location within a chassis, numbered 1 through 12.

**CardIP** – This field shows the IP address of the COM24 card that resides in the chassis and slot combination to its left.

**System\_Integrator\_ID** – This is a user-defined field that can be used in conjunction with the **Property\_ID** below to create a unique identity for every chassis you distribute. Unfortunately, the ability to load this data is not supported by the web interface at this time. Entering this information requires a more advanced tool that will give access to the complete set of instructions contained within the COM24 cards.

**Property\_ID** – This is a user-defined field that can be used in conjunction with the **System\_Integrator\_ID** above to create a unique identity for every chassis you distribute. Unfortunately, the ability to load this data is not supported by the web interface at this time. Entering this information requires a more advanced tool that will give access to the complete set of instructions contained within the COM24 cards. The string ‘:EPG’ indicates that the card is generating the EPG guide channel.

**MAC\_Address** – This value is loaded during the manufacturing process and is unique to every COM24 card. Every IP-enabled device contains a similar address, which is used to ensure that all Ethernet traffic is routed to the correct destinations.

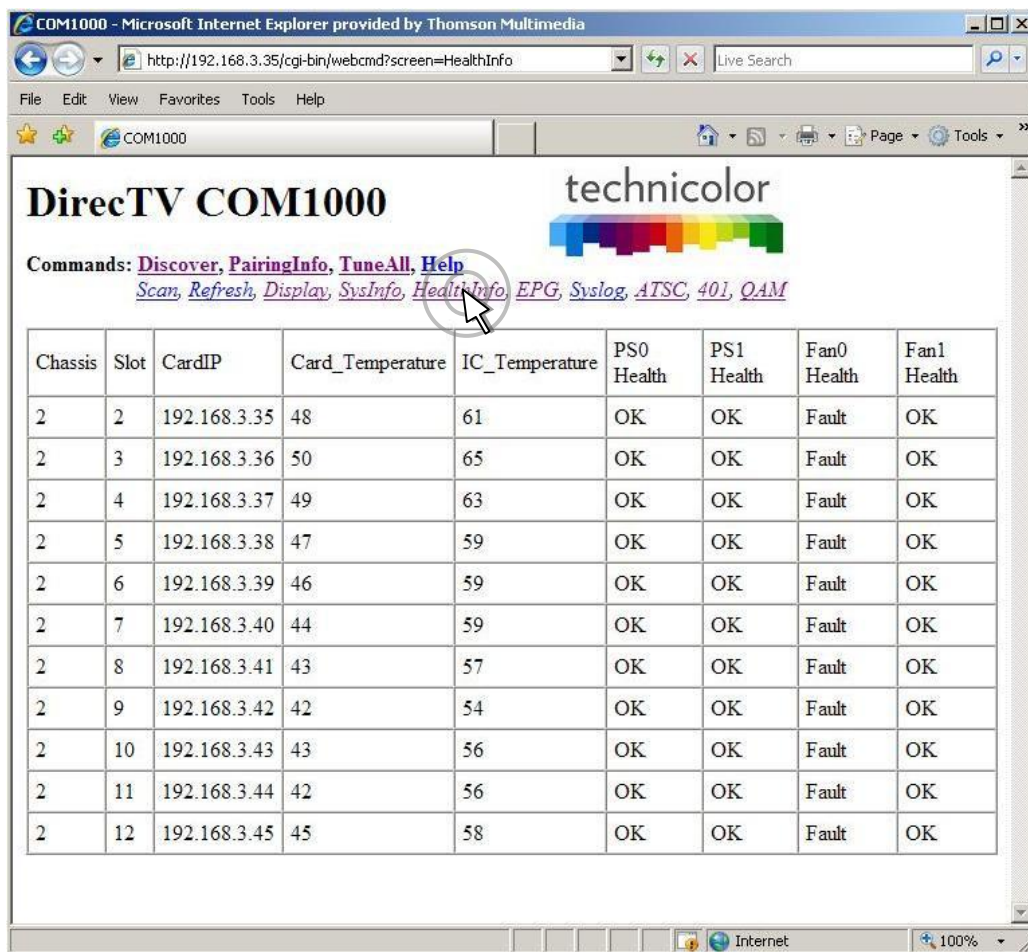
**Serial\_Number** – This value is loaded during the manufacturing process and is unique to every COM24 card. This number is assigned by DIRECTV, and is used to track the COM24 receivers in their database.

*Note: In keeping up-to-date with software upgrades, you may be able to resolve the issues discussed above in future versions of the user interface.*



## 6.7 Evaluating COM1000 Health Status

By clicking the *HealthInfo* hyperlink at the top of any COM1000 web interface page, you will access the page shown in **Figure 33** below. The data available here gives you an impression of the overall health of the COM1000 system, and can be used to identify potential problem areas at a glance.



**Figure 33 – COM1000 HealthInfo Page**

Following is a detailed list of the information available on the *HealthInfo* page.

**Chassis** – This field reports a unique identifier for the chassis. In systems that contain multiple chassis, this can be used to identify each card in the system. See **Section 4.1** on how to assign unique identifiers to multiple chassis within a system.

**Slot** – This field identifies the card’s location within a chassis, numbered 1 through 12.

**CardIP** – This field shows the IP address of the COM24 card that resides in the chassis and slot combination to its left.

**Card\_Temperature** – This field reports the temperature of the COM24 card, as measured on its surface. This essentially gives the ambient temperature inside the COM200 chassis.

**IC\_Temperature** – This field reports the internal temperature of the main processor chip on the COM24 card. An elevated temperature here and nowhere else could mean that this chip is defective.

**PS0 Health** – This field reports the health for Power Supply 0. If the power supply is connected and operating properly, the value should return “OK”. If there is a problem with either of these things, the value will return “Fault”.

Note: Newer chassis will only have a single power supply instead of a dual power supply. These power supplies do not provide health indicators so the PS0 and PS1 Health indicators will report Fault, which should be ignored.

*\*See device labeled “AC Input 1” in Figure 3 in Section 3.2.*

**PS1 Health** – This field reports the health for Power Supply 1. If the power supply is connected and operating properly, the value should return “OK”. If there is a problem with either of these things, the value will return “Fault”.

*\*See device labeled “AC Input 2” in Figure 3 in Section 3.2.*

**Fan0 Health** – This field reports the health for Fan 0. If the fan is connected and operating properly, the value should return “OK”. If there is a problem with either of these things, the value will return “Fault”.

*\*See device labeled “Exhaust Fan 1” in Figure 3 in Section 3.2.*

**Fan1 Health** – This field reports the health for Fan 1. If the fan is connected and operating properly, the value should return “OK”. If there is a problem with either of these things, the value will return “Fault”.



*\*See device labeled “Exhaust Fan 2” in Figure 3 in Section 3.2.*

## 6.8 The *Tune* Command

The *Basic Tune* screen shown in **Figure 34** can be accessed by clicking the *ChannelNumber* link in the *Channel* column of the *Discovery* page (see Figure 25 ). There was no equivalent to this screen in SW versions earlier than ST02.05.05. You can also access the *Basic Tune* screen of any given COM24 card and tuner combination by clicking the channel name/number hyperlink in the *Channel* column on the *Refresh* or *Display* pages.



COM1000 - Microsoft Internet Explorer provided by Thomson Multimedia

http://192.168.3.35/cgi-bin/webcmd?screen=

File Edit View Favorites Tools Help

COM1000

**DirecTV COM1000** 

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Syslog](#), [ATSC](#), [401](#), [QAM](#)

**Channel Tune**

Dest\_IP\_Address:   
 Dest\_Port\_Number:   
 Major\_Number:  \*\*\*

---

QamMajor:   
 QamMinor:   
 Major\_Number:  \*\*\*

[Advanced Edit](#)

Done Internet 100%

**Figure 34 – COM24 Basic Tune Screen**

This form permits two different ways of tuning DIRECTV channels with Pro:Idiom encryption. The first way specifies the destination IP address and port along with the DIRECTV channel number.

**Dest\_IP\_Address** – In this field, you will enter the IP address of the device you wish to stream video content to (i.e. an edge QAM).

**Dest\_Port\_Number** – This field represents the port of the IP address you wish to stream video to. Depending upon the destination, this value may not be freely chosen.

**Major\_Number** – This field is equivalent to the DIRECTV channel number you tune to on a typical DIRECTV tuner.

The second way is used if a QAM24 is in the chassis. The QAM major and minor numbers are set along with the DIRECTV channel number. The IP address will be set to 192.168.6.(chassisId+1) and the port will be set the QAM\_Index \* 16 + QAM\_subchannel.

**QamMajor** – The QAM24 output QAM major channel number. This corresponds to the channel number from the North American Cable Television Frequency Plan (see EIA-542B or <http://www.jneuhaus.com/fccindex/cablech.html> ).

**QamMinor** – The QAM24 output QAM minor channel number. This corresponds to the subchannel number (e.g., 2 in the channel number 13.2 or 13-2 is the subchannel number).

**Major\_Number** – This field is equivalent to the DIRECTV channel number you tune to on a typical DIRECTV tuner.

Use the link *Advanced Edit* to access the Advanced Tune page (**Figure 35**) described below.

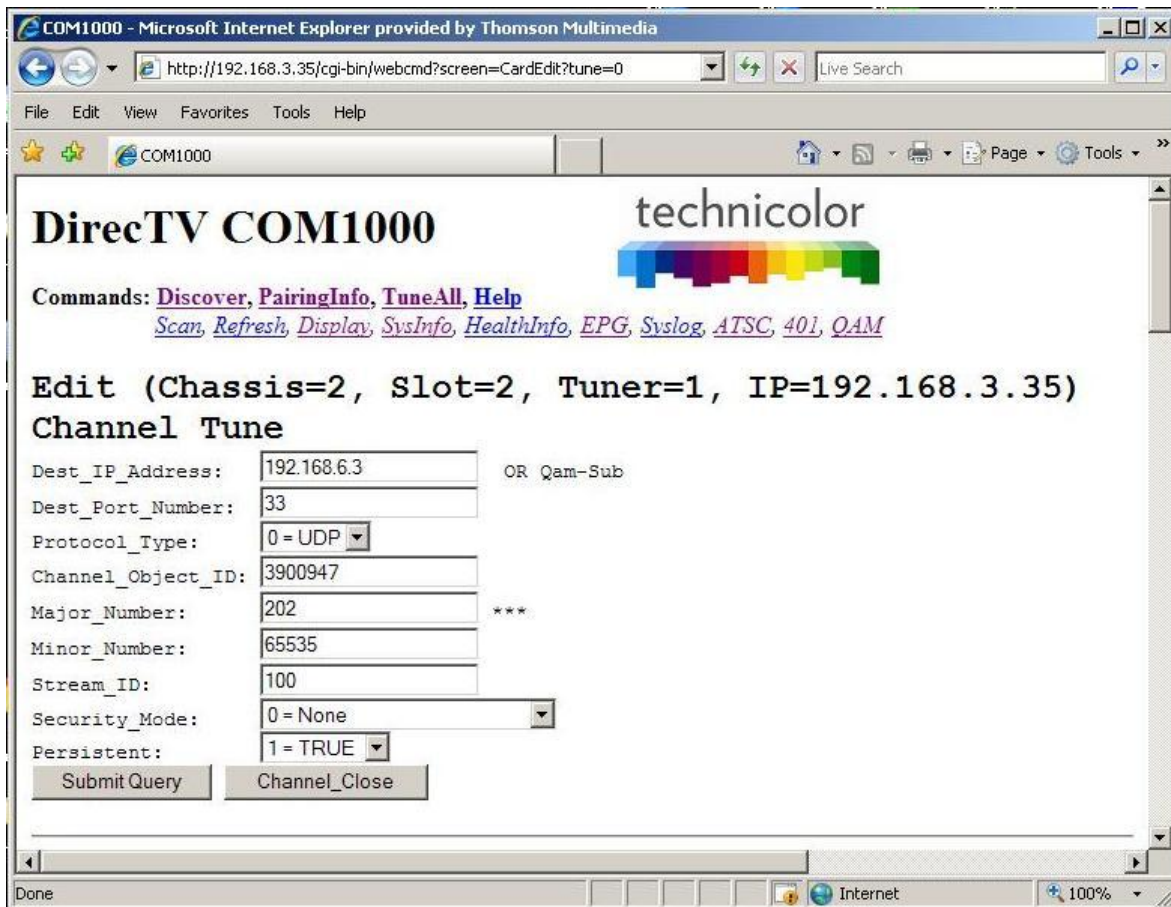
For software versions before ST02.05.05, by clicking the *Tune* hyperlink from the *Edit* column on the old *Discovery* page, you will access the old *Tune* screen, which is similar to the new *Advanced Tune* screen shown in **Figure 35**.

There are many different functions available under the heading of the *Advanced Tune* screen. Each of these functions will be detailed in the subsections that follow.

### 6.8.1 Tuning the COM24 Cards

The *Basic Tune* page can be used to change the main tuning parameters of a channel. Additional tune parameters can be accessed by clicking the *Advanced Edit* hyperlink at the bottom of the *Basic Tune* screen (**Figure 34**), which brings one to the *Advanced Tune* screen (**Figure 35**). A quicker method of executing a mass tune for any number of cards is available under the *TuneAll* command (see **Section 6.9**).





**Figure 35 – Advanced Tune screen portion of Advanced Edit page**

Information identify the tuner currently being tuned is displayed at the top of the web page below the command links. A unique tuner can be identified by chassis number, slot number, tuner number, and IP Address.

**Chassis** – This value shows the Chassis number of the COM200 that holds the COM24 card you are currently tuning.

**Slot** – This value shows the Slot number within the COM200 chassis that holds the COM24 card you are currently tuning.

**Tuner** – This value indicates which tuner on the COM24 card you are controlling. It is important to note that Tuner 0 (‘lower’) in the web interface is the same as the coaxial hub labeled *Tuner 1* on the COM24 card faceplate, and Tuner 1 (‘upper’) in the interface is labeled *Tuner 2* on the faceplate.

**IP** – This field shows the IP address of the COM24 card you are currently interacting with.

A detailed description of each advanced tuning field on the *Advanced Edit* page follows:

**Dest\_IP\_Address** – In this field, you will enter the IP address of the device you wish to stream video content to (e.g. an edge QAM). The COM24 will stream to any valid unicast or multicast IP address entered with no additional steps necessary. However, older COM200 Chassis (pseudo codes BC004 and NC004) require that multicast streams be sent out the front port and an external Ethernet switch be used. The default value is 192.168.0.0.

**Dest\_Port\_Number** – This field represents the port of the IP address you wish to stream video to. Depending upon the destination, this value may not be freely chosen. The default value is 0.

**Protocol\_Type** – This field is used to control whether the COM24 streams the data in UDP or RTP packet structures. The default value is UDP.

**Channel\_Object\_ID** – This field is the data that the COM24 actually uses for tuning purposes. It will be automatically filled in when a valid DIRECTV channel number is entered into the “Major\_Number” field. Before the card has been successfully tuned, the default value is 0.

For some local markets, there are multiple DIRECTV channels with the same channel numbers. To resolve this issue, the Major\_Number and Minor\_Number should be set to zero and the correct Channel\_Object\_ID must be entered. Contact Technicolor to convert the television call letters to the Channel\_Object\_ID. **Major\_Number** – This field is equivalent to the DIRECTV channel number you tune to on a typical DIRECTV tuner. The default value is 0.

**Minor\_Number** – This field is automatically filled in by the COM24 card, with a default value of 65535. If the DIRECTV channel has a minor channel number then the Minor\_Number value must be entered.

Many DIRECTV channels have both a high-definition and standard-definition channels with the same Major and Minor numbers. The COM24 will prefer the high-definition channels in this case. To prefer the standard-definition channels instead, add 100000 to the Minor\_Number. In most cases, this would cause the Minor\_Number to be 165535 if the standard-definition channel is desired.

**Stream\_ID** – This field is optional, and allows a unique identifier to be applied to every video stream produced by the COM1000 system. The allowable values for this field are any whole number between 1 and 65535. The default value is 111.

To enable a second audio stream set the Stream\_ID to 54000.

**Security\_Mode** – Typically, this field will not need to be changed. The only settings most should be concerned with are ‘0 = None’, ‘1 = Pro\_Idiom’, and ‘4 = Transcode’ (*See Section 1.1 for more on transcoding*). The ‘0’ (“off”) setting will only work on DIRECTV channel 100.



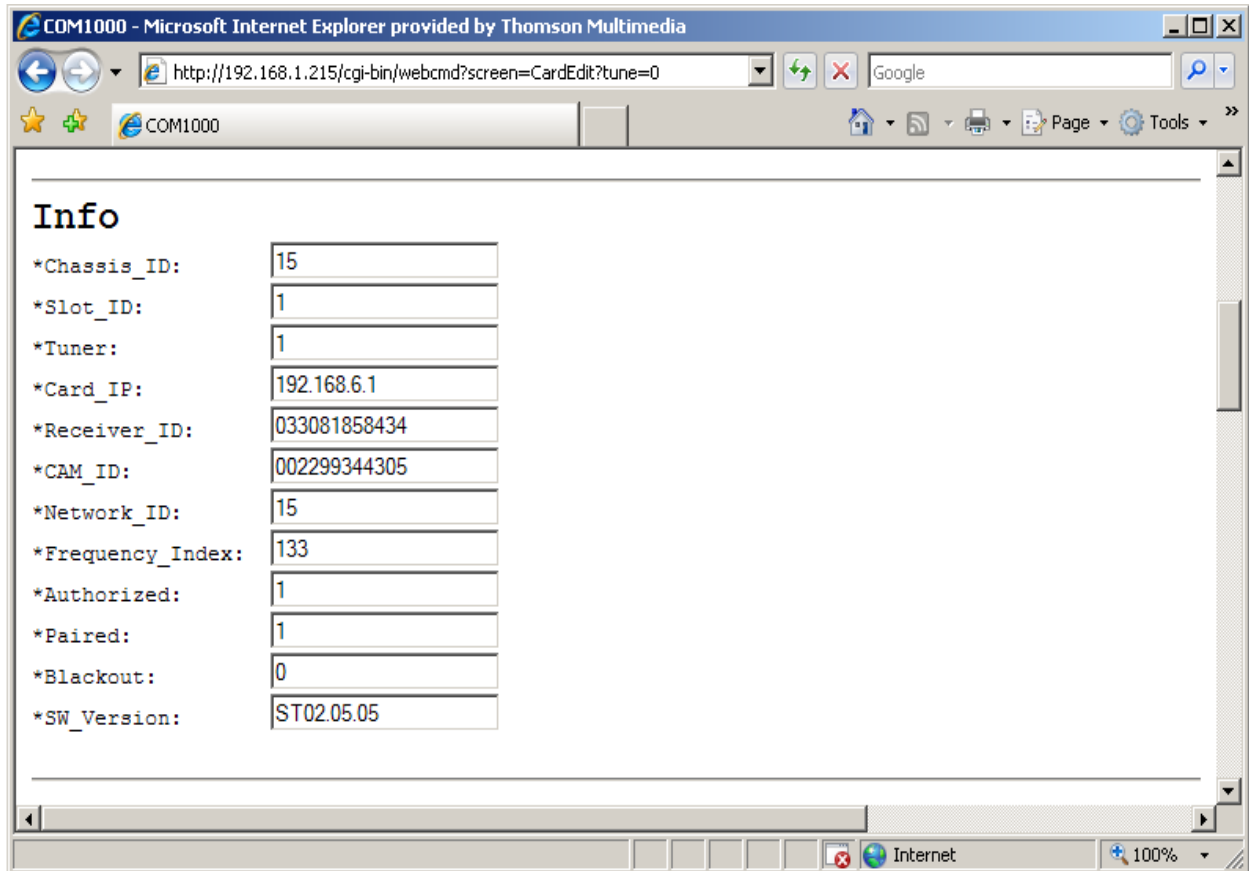
This allows you to turn Pro:Idiom encryption off so that a standard HDTV or PC-based utility like *VLC Media Player* can be used for troubleshooting. The value should be set to ‘1’ at any other time. The default value is 0.

**Persistent** – Setting this value to ‘1’ tells the COM24 to retain all channel and IP-destination settings in memory (i.e., data entered into the card is “persistent”). This eliminates the need to reprogram the COM24 cards after every power-cycle or reboot. **Persistent** is on by default (i.e., 1). It should be on for most installations. Otherwise, all settings will be lost in the event of a power interruption.



### 6.8.2 Evaluating COM24 Informational Status

The information shown in **Figure 36** below is one of the subsections available on the *Advanced Edit* page.



**Figure 36 – “Info” Section on Advanced Edit Page.**

This section provides a selection of many key indicators to the operation of the COM24 card. It acts as a concise index to the characteristics of each individual COM24 card according to its status and user-defined settings.

Following is a brief explanation of each field shown above.

**Chassis\_ID** – This field represents which COM200 chassis the card resides in when there are multiple chassis in the system.

**Slot\_ID** – This field identifies the card’s location within a chassis, numbered 1 through 12.

**Tuner** – This field identifies the tuner’s location on the COM24 card (0 or 1).

**Card\_IP** – This field shows the IP address of the COM24 card you are currently interacting with.

**Receiver\_ID** – This field reports the DIRECTV Receiver ID, or RID. This value is the first of two parameters required to obtain authorization on the DIRECTV network.

**CAM\_ID** – This field reports the DIRECTV CAM ID. This value is the second of the two parameters required to obtain authorization on the DIRECTV network.

**Network\_ID** – This field reports the DIRECTV network that the tuner is currently tuned to. The value recorded here corresponds to the satellite being used to transmit the channel as is determined by the most recent DIRECTV broadcast settings.

**Frequency\_Index** – This field reports the frequency index corresponding to the channel the tuner is currently set to.

**Authorized** – This field provides feedback on whether the card has been authorized within the DIRECTV network. The card needs to be paired and authorized in order to receive DIRECTV programming. A value of ‘1’ means that the card has been successfully authorized; ‘0’ means that it has not yet been authorized, or has lost its authorization.

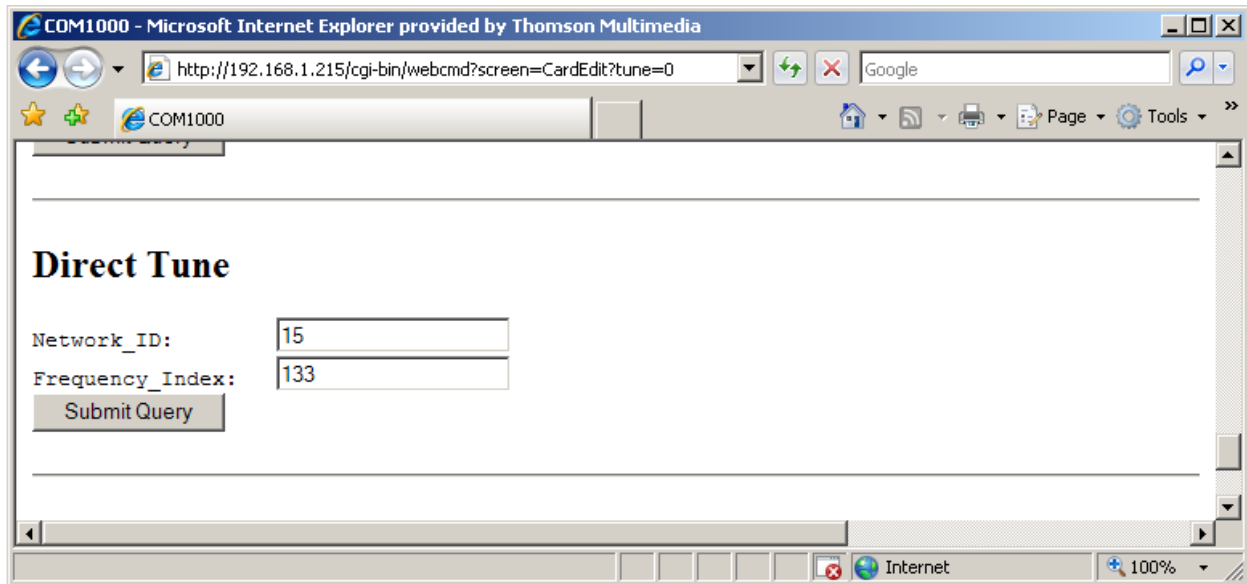
**Paired** – This field provides feedback on whether the smart card has been successfully paired with the COM24 card. The card needs to be paired and authorized in order to receive DIRECTV programming. A value of ‘1’ means that the card has been successfully paired; ‘0’ means that it has not yet been paired, or has lost its pairing.

**Blackout** – This field can be used to determine whether DIRECTV has issued a blackout of the content on a particular channel. This is a good thing to investigate if the video suddenly stops playing on any channel, but it is particularly likely to happen with nationally televised sporting events. A value of ‘0’ means that the channel should be functioning properly; ‘1’ means that the programming on the selected channel is not currently available to you. TVs will display a blackout message on screen in the event of a blackout.

**SW\_Version** – This field reports the software version that currently resides in the COM24 card. All cards that have a similar web interface to the one described in this document will have a version number of at least ST01.00.25.

## Using the COM24 “Direct Tune” Feature

The information shown in **Figure 37** below is one of the subsections available on the *Advanced Edit* page.



**Figure 37 – “Direct Tune” Interface on Advanced Edit page**

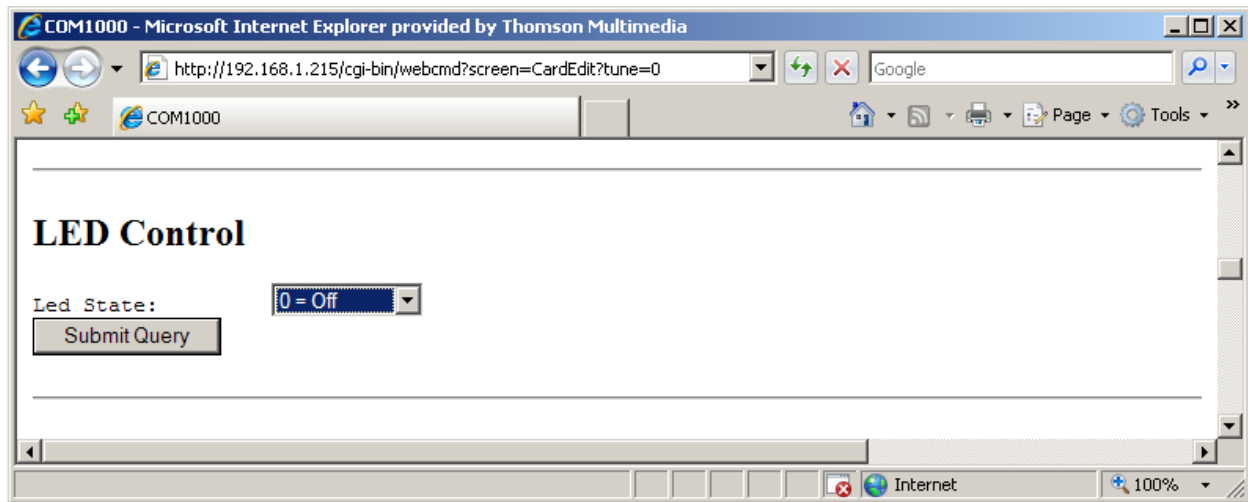
This section gives you a method to force a tuner to a particular satellite and transponder pair. This ability can especially be useful when attempting to track and isolate RF problems with the COM1000 system. The data required to perform this operation can be gathered from the basic “Tune” interface shown in **Figure 34** above. A brief explanation of each field follows.

**Network\_ID** – This field displays the DIRECTV network of the currently tuned channel. This number correlates to a specific satellite, and can be used in conjunction with the “Frequency\_Index” field below to determine whether the card is locked to the correct channel version (as of this version of the manual, all SD content resides on Network 0, and the HD content is spread across Networks 10 and 15).

**Frequency\_Index** – This field displays the DIRECTV frequency index of the currently tuned channel. This number correlates to a specific transponder, and can be used in conjunction with the “Network\_ID” field above to determine whether the card is locked to the correct channel.

## 6.8.4 Using the COM24 LED Control Feature

The information shown in **Figure 38** below is one of the subsections available on the *Advanced Edit* page.



**Figure 38 – “LED Control” Interface on Advanced Edit page**

This section gives you the ability to assume control of the PWR LED temporarily. This feature can help you easily identify a specific card within a chassis if there is ever any doubt about which card you are accessing. A brief explanation of each field shown above is as follows:

**LED\_State** – This field allows you to control the PWR LED. This may be used as a simple means to identify a particular card within a chassis at a remote location. The allowed values are:

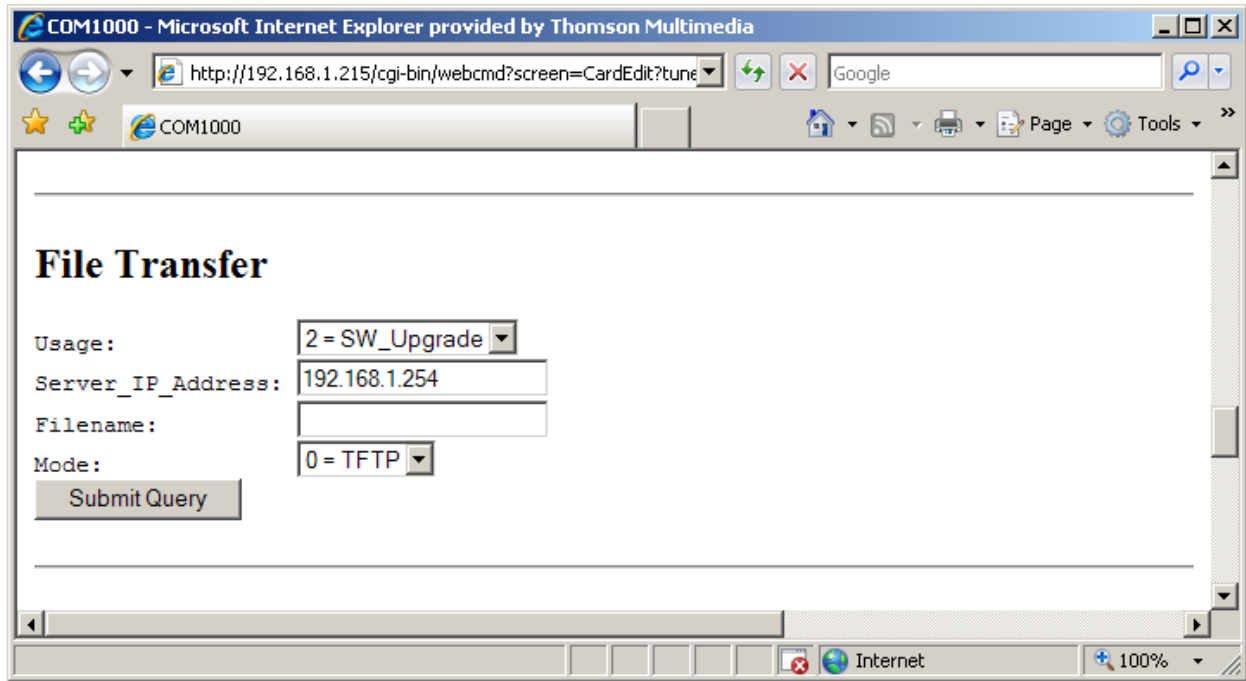
*0 = Off*

*1 = On*

*2 = Flashing*

### 6.8.5 Using the COM24 File Transfer Utility

The information shown in **Figure 39** below is one of the subsections available on the *Advanced Edit* page.



**Figure 39 – “File Transfer” Interface on Advanced Edit page**

Similar in function to the upgrade section found on the *PairingInfo* page, this section provides you with a method of transferring software updates to or transferring log data from individual COM24 cards.

**See Section 7 for more information on upgrading your COM24 cards.**

Following is a brief explanation of each field shown above.



**Usage** – This field is used to tell the COM24 which type of transfer to execute. Only two values are available for customer use (all others are for development purposes only):

2 = *Software Upgrade* – This option is used to update the COM24 software. In this case, the file is downloaded to the COM24 card specified by the earlier Card IP address.

3 = *Log* – This option tells the COM24 to transfer its log file to the destination entered in the “IP\_Address” field (i.e., log file is uploaded to PC).

**Server\_IP\_Address** – This field tells the COM24 card where to retrieve the software update or where to send the log file, based upon the “Usage” setting above. The default value for this field is 192.168.1.254.

**Filename** – This value entered in this field tells the COM24 which file to download (in the case of software updates), or what name you want to give the log file being transferred from the card.

**Mode** – This field is used to tell the COM24 card which file-transfer protocol to use for the file transfers. The supported modes are TFTP (option ‘0’) and FTP (option ‘1’), allowing you to select the mode that best works with the software you use for the transfer. The default setting is 0.

**See Section 5.3 for more information on using FTP vs. TFTP.**

The card will automatically reset after completing an upgrade.

## 6.8.6 Setting the COM24 User Configuration Options

The information shown in **Figure 40** below is one of the subsections available on the *Advanced Edit* page.



**Figure 40 – “User Config” Interface on Advanced Edit page**

This section gives you the ability customize select features of the COM24 cards to better suit your application. The cards actually support a few more features than shown here, but the two most useful features have been made available here. You have the ability to change the mechanism the cards use to obtain IP addresses and the ability to send log data to a PC or other monitoring mechanism.

Following is a brief explanation of each field shown above.

**CardIP** – This field represents the IP address of the COM24 card that you are currently interacting with. The value is filled in automatically.

**IP\_Config** – This field allows for one of 9 methods of IP address assignments to be chosen. When changing the value in this field, you must also enter a valid address in the “Base\_IP” field below, as the parameters are used to create a new IP address for the cards. The default setting is 0.

- 0 = Default*
- 1 = DHCP\_Persistent*
- 2 = NA*
- 3 = NA*

- 4 = *Fixed*
- 5 = *NA*
- 6 = *NA*
- 7 = *NA*
- 8 = *NoChange*

**Base\_IP** – This field gives the COM24 card a starting point for defining its IP address in several of the modes listed above.

**Subnet** – This field allows you to give a subnet mask of your choosing to the COM24 card. Clear this field to use a default subnet.

**Gateway** – This field allows you to set a default gateway of your choosing for the COM24 card. Clear this field to remove the gateway value.

**Time-to-Live** – Time to Live field in IP protocol header.

**Log\_IP** – This field allows you to direct the COM24 card to send its log files to an external destination automatically. This is very useful for monitoring the health of the system over an extended period. After entering the IP address of the destination, the log files will start being forwarded to this address after a short delay. You may then run a system-logging utility like *Kiwi* on the destination computer to capture this information.

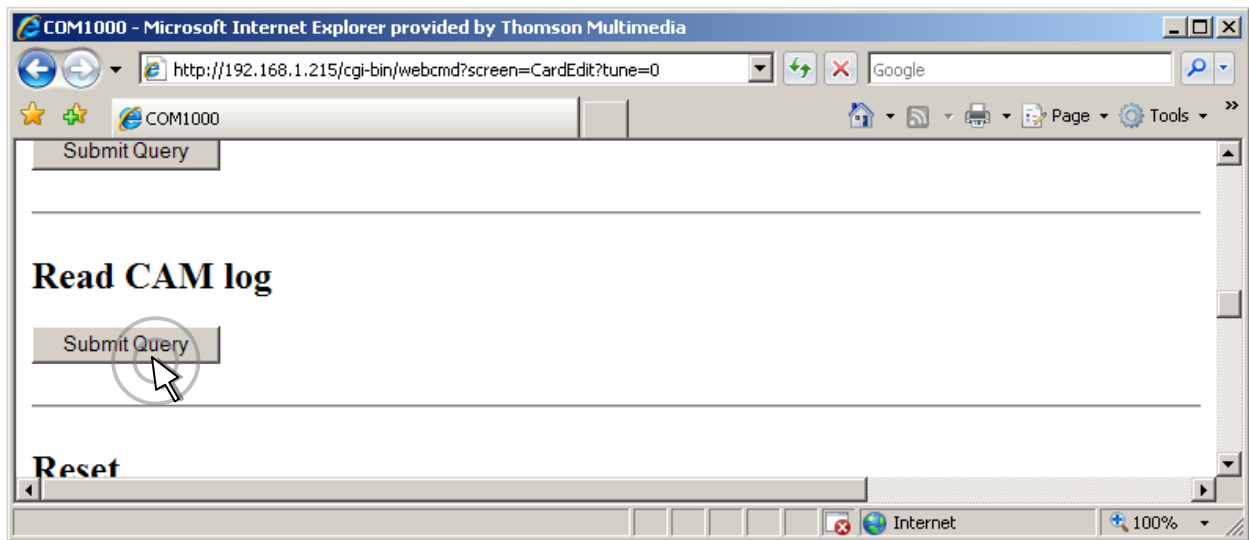
**Log\_Level** – This field allows you to define the level of detail that will be captured in the resulting log files. Due to the complexity of this setting, it is strongly advised that it be left blank unless someone from support has asked to change the value.

**UtilConfig** – This field is for development purposes only, and should be left blank unless you have been asked to modify the value by someone from support.

**Please refer to Appendix A for more information on using these settings.**

### 6.8.7 Reading the COM24 CAM Log Data

The information shown in **Figure 41** below is one of the subsections available on the *Advanced Edit* page.



**Figure 41 – “CAM Log” Interface on Advanced Edit page**

This section gives you the ability to read the log files generated by any COM24 card's Conditional Access Module (CAM), also known as its smart card. The messages reported here match the ones that may be seen on a normal set-top box, and can be used to determine whether the card has been properly authorized and paired.

Under normal circumstances, an authorized card will produce a very short CAM log file that looks like the image shown in **Figure 42** below.



**Figure 42 – CAM Log Report**

If, however, there are issues with the card’s authorization, you will see messages that look more like this:

```
0 0 0: CARD_INSERTED
1 9 727: 727 - Program Not Available in Your Area (Service Blacked Out)
  [GMT=Thu May 12 00:00:00 2011]
2 0 0: Can't view [GMT=Thu May 12 00:00:00 2011]
3 0 0: Blackout [GMT=Thu May 12 00:00:00 2011]
4 9 727: 727 - Program Not Available in Your Area (Service Blacked Out)
  [GMT=Thu May 12 00:00:00 2011]
5 0 0: Can't view [GMT=Thu May 12 00:00:00 2011]
6 0 0: Blackout [GMT=Thu May 12 00:00:00 2011]
7 9 727: 727 - Program Not Available in Your Area (Service Blacked Out)
  [GMT=Thu May 12 00:00:00 2011]
```

The 3-digit values starting with a “7” are the DIRECTV support extension numbers associated with the error condition.

Other things that you may see reported here include messages about access card not being active, wrong or missing RID number, card not paired, and programming information for audio-only channels. Many commercial TVs won’t play audio-only channels.



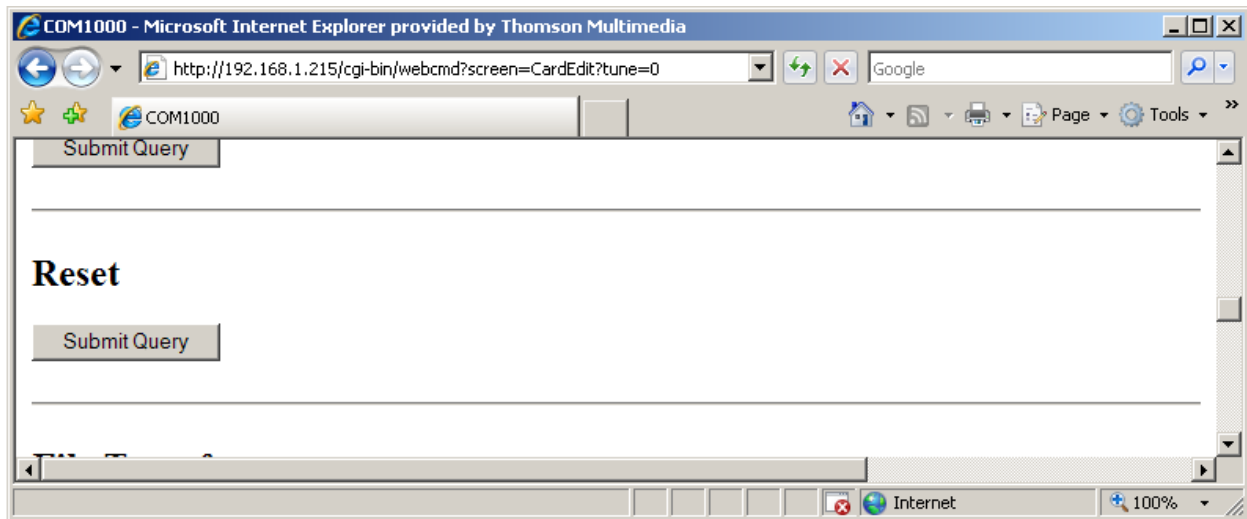
There are a few fields as described below:

**Refresh** – Refreshes this display.

**Clear\_CAM\_Log** – Clears all current entries in that card's CAM log.

## 6.8.8 Using the COM24 Software Reset Feature

The information shown in **Figure 43** below is one of the subsections available on the *Advanced Edit* page.



**Figure 43 – “Reset” Interface on Advanced Edit page**

This section allows you to initiate a software reset on the card identified in the “CardIP” field. This is sometimes helpful in situations where a card has become non-responsive. Activating this feature is the equivalent to pushing the recessed reset button on the face of the COM24 card, and has a similar effect as pressing the small reset button on a traditional set-top box.



## 6.9 Using the COM1000 TuneAll Command

The information shown in **Figure 44** below is the result of clicking the *TuneAll* hyperlink at the top of any COM1000 web interface page.

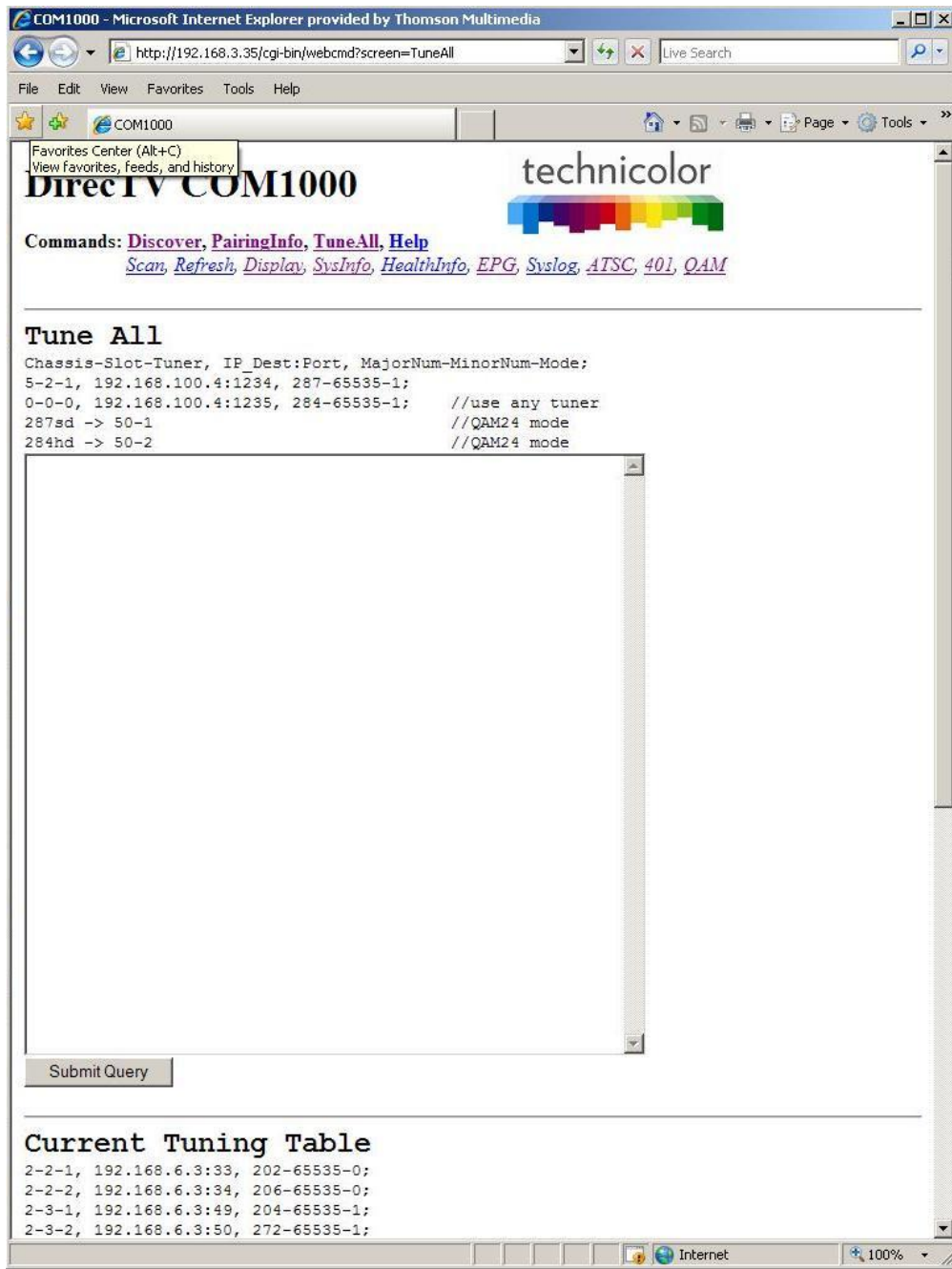


Figure 44 – COM1000 TuneAll Page



This section provides a practical way to configure an entire COM1000 system with minimal effort. In order to use this feature, you can start by copying and pasting the information provided at the bottom of the browser page (below the *Submit Query* button) either directly into the text field provided or into your text editor of choice, and then modifying it as indicated by the guide comments located above the text field. Examples are provided below to help you understand how to utilize this feature.

*Note: Saving a copy of the tuning table for your entire system in the form of a text file is recommended, just in case the settings are not fully restored after a system reset.*

The lines in the tuning table take the following form (see **Section 6.8.1** for more on tuning):

Chassis-Slot-Tuner, IP\_Address:Port\_Number, Major\_Number-Minor\_Number-Security\_Mode;

The sample line below indicates the upper tuner of a card residing in Slot #4 of Chassis #2. It is targeting Port 301 of the device residing at the IP address 192.168.4.245, and tuned to the HD broadcast of channel 242 with Pro:Idiom encryption set.

2-4-1, 192.168.4.245:301, 242-65535-1;

Upon initial system startup, your table might look something like this:

```
Current Tuning Table
1-1-0, 192.168.0.0:0, 0-0-0;
1-1-1, 192.168.0.0:0, 0-0-0;
1-2-0, 192.168.0.0:0, 0-0-0;
1-2-1, 192.168.0.0:0, 0-0-0;
1-3-0, 192.168.0.0:0, 0-0-0;
1-3-1, 192.168.0.0:0, 0-0-0;
1-4-0, 192.168.0.0:0, 0-0-0;
1-4-1, 192.168.0.0:0, 0-0-0;
1-5-0, 192.168.0.0:0, 0-0-0;
1-5-1, 192.168.0.0:0, 0-0-0;
1-7-0, 192.168.0.0:0, 0-0-0;
1-7-1, 192.168.0.0:0, 0-0-0;
1-9-0, 192.168.0.0:0, 0-0-0;
1-9-1, 192.168.0.0:0, 0-0-0;
```

After modifying the data to meet your system needs, it might look something like this:

```
Current Tuning Table
1-1-0, 192.168.4.245:6401, 3-65535-1;
1-1-1, 192.168.4.245:6402, 10-65535-1;
1-2-0, 192.168.4.245:6403, 29-65535-1;
1-2-1, 192.168.4.245:6657, 6-65535-1;
```



```
1-3-0, 192.168.4.245:6658, 17-65535-1;
1-3-1, 192.168.4.245:6659, 259-65535-1;
1-4-0, 192.168.4.245:6913, 209-65535-1;
1-4-1, 192.168.4.245:6914, 276-65535-1;
1-5-0, 192.168.4.245:6915, 280-65535-4;
1-5-1, 192.168.4.245:7169, 306-65535-4;
1-7-0, 192.168.4.245:7170, 501-65535-4;
1-7-1, 192.168.4.245:7171, 218-65535-4;
1-9-0, 192.168.4.245:7426, 206-65535-4;
1-9-1, 192.168.4.245:7427, 545-65535-4;
```

After editing the tuning table, you simply need to copy and paste this information into the large field provided by the *TuneAll* command, and then click **Submit Query**.

If you are using a QAM24 Card, you can also use the syntax of

Channel[hd|sd] -> QamMajor-QamMinor

For example, to tune the first unused tuner to the HD Science channel so that it will be QAM modulated at channel 50-1 use:

284hd -> 50-1

## 6.10 Using the DIRECTV Electronic Program Guide (EPG)

Each COM24 card gives you access to an integrated Electronic Program Guide (EPG) that can be used to create a user-defined guide channel of all programming offered at your location. The setup is done through the same web interface as is used for the normal system setup. The guide can be expanded to include all channels being offered at the property, whether the source is the COM1000, an analog SMATV system, or over-the-air signals. The only limitation to what channels can be added to the EPG is that they must also exist in DIRECTV's channel lineup.

There are some important items to note when working with the EPG:

1. The EPG information can only be contained within a single card. You cannot access your EPG settings when logging in to any other card. Therefore, it is important to keep track of which card contains your guide information. It is also recommended to keep a text file containing the EPG listing in case you lose access to that particular card. The SysInfo page will show ':EPG' in the Property\_ID field if a card is transmitting the EPG channel.
2. The EPG is created in such a way that it provides the viewer with what appears to be an auto-scrolling channel listing. It is essentially a dynamic MPEG video stream made up of still images of the current programming. It moves down the list of assigned channels every 2.5 seconds, creating a constant cycle, showing nine channels at a time. As such, the guide is not interactive, so the viewer must manually tune to their channel of choice.
3. If the number of channels in the EPG fits in one screen (nine or less) the channel listing will not scroll. This permits the installer to have multiple cards generating a different EPG channel listing nine channels each. This will create the user experience that channeling up or down will page up or down nine channels in the guide.
4. The SysInfo tab will show which cards are generating an EPG by placing the string ":EPG" in the Property\_ID field.
5. The EPG can also convert the DIRECTV guide information into PSIP guide information that is decodable by many televisions. Most commercial televisions appear to ignore PSIP guide information. PSIP permits the channel number to be remapped, the channel name can be displayed, the current time displayed, and the current and next program titles displayed. To generate PSIP guide information, the last two numbers for each channel must list the QAM24 chassis number and QAM24 destination port number. This information is automatically filled in when EpgLoad is clicked. To disable PSIP guide generation for a channel, set the port number to -1. If the DestIP is a valid IP address but the DestPort is 0, then the EPG channel is disabled but PSIP guide generation is still enabled.

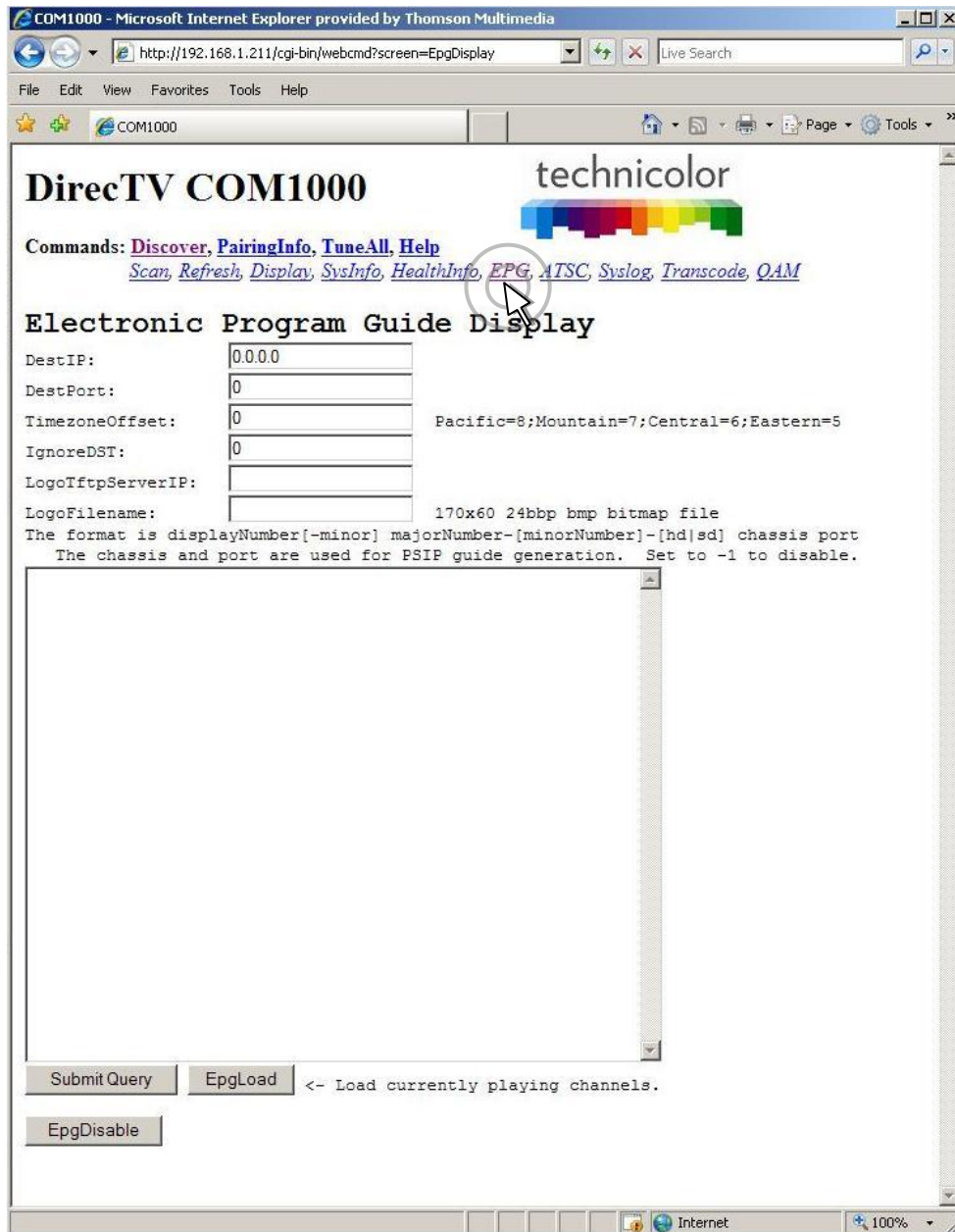
6. It is possible to add non-DIRECTV channels to the EPG. This is done by adding an entry where instead of a DIRECTV channel number, the capital letter 'N' appears followed by the channel name, and program information separated by underscore characters. For example:

10-1 NLobby\_The\_lobby\_channel 1 17

7. Each channel in the EPG is comprised of a still image and it can take up to 10 seconds to produce the image for every channel being offered when the EPG is first loaded. For example, a location offering a list of 18 channels can expect to wait up to 3 minutes for a first-time EPG configuration.
8. Due to the combination of the auto-scroll programming and the constant addition of new channels, you can expect the EPG to exhibit some odd behavior during the initial image creation. It may appear to skip around at random, but it can be expected to settle back into a normal operational state once it has finished generating all the necessary images.
9. The EPG is a video-only channel, and you cannot set audio to play in the background.
10. A COM24 card that is set to transcode cannot support an EPG. This means that any COM24 that has been paired with an XDR24 is incapable of storing and displaying an EPG.
11. Because the EPG is generated from the DIRECTV program guide data, you can only add channels that are active in the DIRECTV channel lineup. For example, you cannot add an independent local channel to your EPG unless it is also offered on DIRECTV.
12. You must remember to reprogram the EPG anytime your location's channel offering is remapped.

## 6.10.1 Starting Out

In order to access the EPG setup screen shown in **Figure 45** below, simply click the *EPG* hyperlink at the top of any COM1000 web interface page.



**Figure 45 – COM1000 EPG Page**

Following is a brief explanation of each field available on the *EPG* page as shown above.

**DestIP** – This field represents the IP address of the device you wish to send the EPG data to. In a typical installation, this will be the address of the edge QAM device. The default value is 0.0.0.0.

*Note: the default value of 0.0.0.0 can be entered at any time to disable the EPG channel.*

**DestPort** – This field represents the port number that is to be used to map the EPG to a specific QAM channel. The default value is 0.

**TimeZoneOffset** – This field is used to tell the COM24 to shift the guide data by the appropriate amount of time to account for the property’s time zone. Example values can be seen to the right of the field. The default value is 0.

**IgnoreDST** – This field is used to tell the COM24 to ignore Daylight Savings Time, if needed. This is accomplished by entering a value of ‘1’ here. The default value is 0.

**LogoTftpServerIP** – This field is used to tell the COM24 where to find the custom logo for the property. This will be the IP address of the PC containing the TFTP server.

**LogoFileName** – This field is used to tell the COM24 the name of the file that is to be used for the logo.

**See Section 0 for more information on selecting and uploading a custom logo for your EPG.**

The EPG’s channel lineup is created in the large textbox on the lower half of the screen, using the following format:

```
displayNumber majorNumber-[minorNumber]-[hd|sd] chassis port
```

**displayNumber** – This is the TV channel that the viewer will find the program on.

**majorNumber** – This is the same as the “Major\_Number” field in the *Channel Tune* interface.

**minorNumber** – This is the same as the “Minor\_Number” field in the *Channel Tune* interface. Please note that on submission, the EPG will default to ‘65535’ if this value is not provided.

**hd|sd** – This tells the guide whether to pull the data for the HD or the SD version of a particular channel. The default behavior for the COM1000 is to look for HD channels, so this setting allows you to add SD channels to the EPG if needed. Please note that on submission, the EPG will default to ‘hd’ if this value is not provided.

**chassis** – This tells the guide which chassis the QAM24 is in so that it knows the QAM24’s IP address for sending PSIP guide data. If not using PSIP this field can be set to -1.

**port** – This tells the guide which QAM24 UDP port is being used for sending PSIP guide data. If not using PSIP this field can be set to -1.

### Examples:

10 501-65535-hd → TV channel 10 carries HBOHD (from COM1000)  
23 209-65535-hd → TV channel 23 carries ESPN2HD (from COM1000)  
45 202-65535-sd → TV channel 45 carries CNN (from SMATV or COM1000)  
37 8-65535-hd → TV channel 37 carries local channel 8 (from OTA, SMATV, or COM1000)  
10-1 NLocal\_Program\_Info 1 71 → Non-DIRECTV channel (channel name Local)

*Note: The actual content could come from the COM1000, a separate analog SMATV system, or even from on-air, as long as the channel is available in DIRECTV’s lineup.*

The first time you access the EPG page, it will be blank, as shown in **Figure 45** above. Note that, as mentioned previously, this page applies to the card that you are currently logged in to, and that an EPG can only exist on one card. If you have previously completed an EPG configuration and instead see a blank page like the one shown above, you are probably logged in to the wrong COM24 card. After a successful configuration, the screen should look similar to the one shown below in **Figure 46**.



COM1000 - Microsoft Internet Explorer provided by Thomson Multimedia

http://192.168.3.35/cgi-bin/webcmd?screen=EpgDisplay

File Edit View Favorites Tools Help

COM1000

## DirecTV COM1000

technicolor

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SvsInfo](#), [HealthInfo](#), [EPG](#), [Svslog](#), [ATSC](#), [401](#), [QAM](#)

### Electronic Program Guide Display

DestIP:

DestPort:

TimezoneOffset:  Pacific=8;Mountain=7;Central=6;Eastern=5

IgnoreDST:

LogoTftpServerIP:

LogoFilename:  170x60 24bbp bmp bitmap file

The format is displayNumber[-minor] majorNumber-[minorNumber]-[hd|sd] chassis port  
 OR displayNumber-minor NMyChan\_Event\_info chassis port

The chassis and port are used for PSIP guide generation. Set to -1 to disable.

```

30-1 6-65535-hd 2 17
30-2 NWRTV_Local_Weather 2 18
31-1 202-65535-hd 2 33
31-2 206-65535-hd 2 34
31-3 8-65535-hd 2 35
32-1 204-65535-sd 2 49
32-2 272-65535-sd 2 50
32-3 NWISH_Local_Weather 2 51
33-1 248-65535-hd 2 65
33-2 271-65535-sd 2 66
33-3 13-65535-hd 2 67
34-1 244-65535-hd 2 81
34-2 242-65535-hd 2 82
34-3 NWTIR_Local_Programming 2 83
35-1 236-65535-hd 2 97
35-2 287-65535-sd 2 98
35-3 20-65535-hd 2 99
36-1 242-65535-hd 2 113
36-2 245-65535-hd 2 114
36-3 59-65535-hd 2 115
37-1 269-65535-hd 2 129
37-2 241-65535-hd 2 130
38-1 296-65535-hd 2 145
38-2 329-65535-hd 2 146
    
```

<- Load currently playing channels.

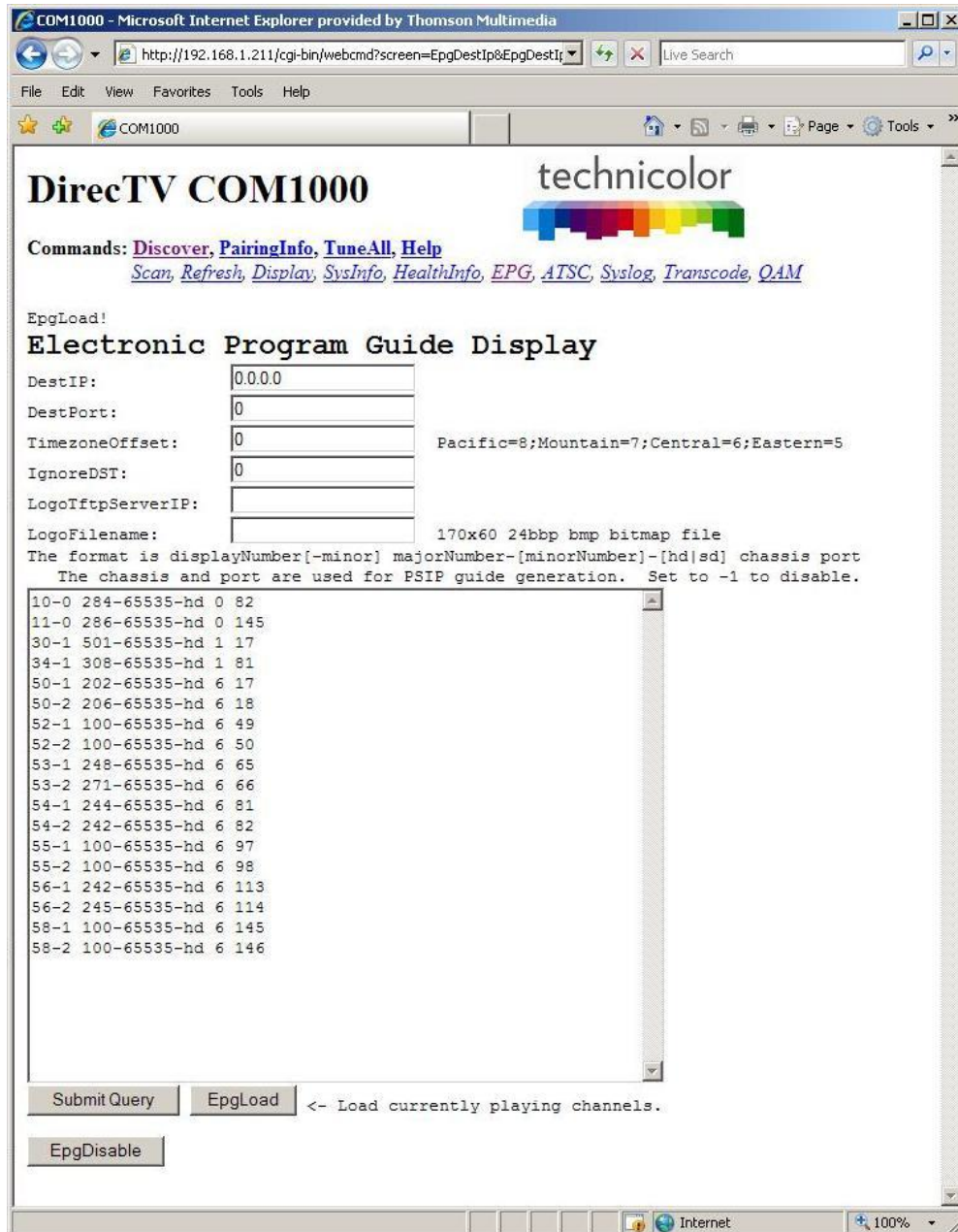
Internet 100%

Figure 46 – COM1000 EPG Page (Configured)



## 6.10.2 Configuring the EPG

The screen shown in **Figure 47** below is the result of clicking the *EpgLoad* button located at the bottom of the *EPG* screen. Doing this provides a convenient starting point for building an EPG for your system.



**Figure 47 – COM24 EPGLoad Result**



The results shown on this page contain the programming information for all COM24 cards in your system based on the current tuning table. The function builds a channel lineup starting with channel 10. It then assigns channel information starting from the first tuner on the leftmost card in the lowest-numbered chassis and steps up one channel for every successive tuner. This information will automatically be loaded into the appropriate text field the next time you visit the *EPG* page.

***Note:** In the submission results shown above, a '0' at the end of a channel line refers to a submission of 'sd' and '1' refers to 'hd'.*

In order to customize the EPG to match the property’s lineup, you will need to go back to the main EPG screen by clicking the *EPG* link at the top of the page. From this screen, you will need to tell the COM24 card where to send the EPG data (an edge QAM, for instance), define a time zone offset, and modify the lineup as needed. You may also upload a logo for the property that will be displayed in the upper right corner of the EPG. See **Section 6.10.3** for instructions on selecting and uploading a logo.

When modifying the EPG channel lineup, the channels can be entered in any order, as the COM24 card will automatically sort them by channel number when it builds the guide. As with the tuning table on the *TuneAll* page, you may edit the EPG information in its text field on the page, but it is recommended that you make all changes in a separate text editor and save a copy of the text file for easy retrieval in the case of any information loss.

Once you are finished entering all of the information necessary to build your EPG, simply click the “Submit Query” button at the bottom of the screen. Doing so will provide you with a screen that reports all of the data the COM24 card has been sent. This screen will look similar to the resulting screen after clicking the *EPGLoad* button. Once the EPG has had enough time to configure, the resulting guide channel should look like **Figure 48** below.



DIRECTV		DIRECTV Guide		
Mon 7/12	2:00p	2:30p	3:00p	
24 USAHD	White Collar <b>HD</b>		White Collar <b>HD</b>	>
27 OXGN	Roseanne	Roseanne	Roseanne	
28 DSCHD	Overhaulin' <b>HD</b>		American Chopper	>
30 APLHD	Animal Cops Philadelphia <b>HD</b>		Animal Cop... <b>HD</b>	>
32 AMC	< Cold Mountain			>
41 HISTHD	How Bruce Lee Changed the World <b>HD</b>			>
45 CNeHD	Scooby-Doo in Where's My Mummy?			
50 COMHD	The Daily... <b>HD</b>	The Colbert... <b>HD</b>	My Boss's... <b>HD</b>	>
57 SPKEHD	The Unit <b>HD</b>		Walker, Texas...	>

**Figure 48 – Guide Channel (EPG)**



### 6.10.3 Adding a Logo to the EPG

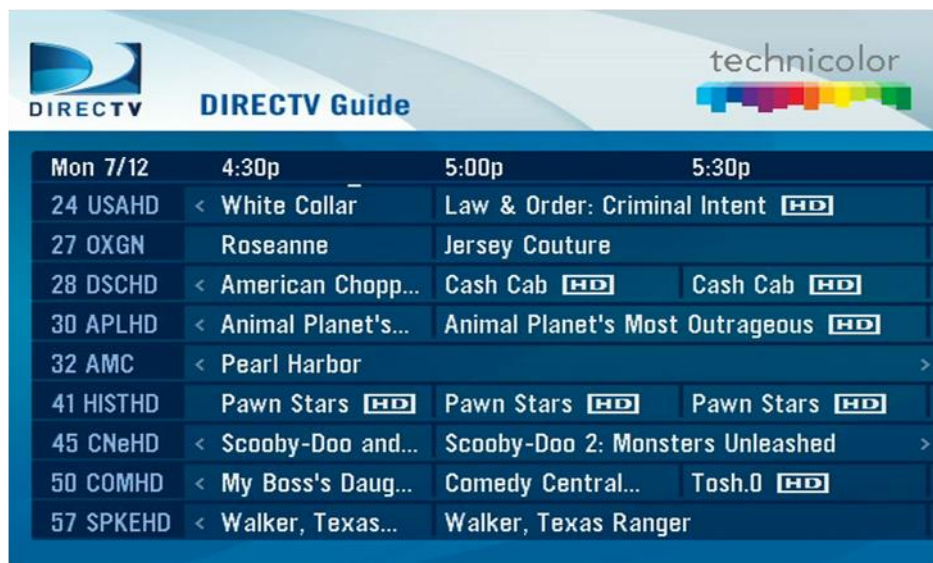
The COM24 has a built-in facility for superimposing a property’s logo into the upper right corner of the EPG. Should the System Operator express an interest in providing such a logo, it is entirely up to the property to employ someone to do so. It is recommended that you work with someone in either the property’s Branding or Corporate Identity department or with a graphics professional in order to obtain an image that is in the proper format to be added to the EPG.

In order to work properly with the EPG, the logo must be saved as a 24-bit bitmap (\*.bmp) file, and can be no larger than 170x60 pixels in size (170 pixels wide and 60 pixels long). In addition, the image’s background can be made to render as transparent by changing the color to magenta (RGB values of 251-0-255). An example of this can be found in **Figure 49** below.



**Figure 49 – EPG Logo Adjustments**

Once the image has been properly uploaded (see **Section 5.3** on using TFTP) by using the “LogoTftpServerIP” and “LogoFileName” fields on the *EPG* page, you should see the logo appear in the upper right corner of the guide channel screen, as can be seen in **Figure 50** below.



**Figure 50 – Guide Channel (EPG) with Custom Logo**

## 6.11 Using the COM24 Syslog Command

The information shown in **Figure 51** below is the result of clicking the *Syslog* hyperlink at the top of any COM1000 web interface page. Note that this method of displaying the syslog will only show the last 500 lines of messages from the card you are currently logged into.



```

COM1000 - Microsoft Internet Explorer provided by Thomson Multimedia
http://192.168.3.35/cgi-bin/webcmd?screen=Syslog
Live Search
File Edit View Favorites Tools Help
COM1000
DirecTV COM1000
technicolor
Commands: Discover, PairingInfo, TuneAll, Help
Scan, Refresh, Display, SysInfo, HealthInfo, EPG, Syslog, ATSC, 401, QAM
Syslog:
Sep 12 07:00:33 com24-2-2 syslog: m: Number of free blocks is 339 of 512, Numbe
Sep 12 07:00:40 com24-2-2 syslog: HDXEA: 0
Sep 12 07:00:44 com24-2-2 syslog: HDXEA: 1
Sep 12 07:00:45 com24-2-2 syslog: a: MOcount (0,2522347)
Sep 12 07:00:49 com24-2-2 syslog: a: MOcount (1,2548608)
Sep 12 07:01:37 com24-2-2 syslog: HDXEA: 0
Sep 12 07:01:43 com24-2-2 syslog: HDXEA: 1
Sep 12 07:01:46 com24-2-2 syslog: a: MOcount (0,2522748)
Sep 12 07:01:50 com24-2-2 syslog: a: MOcount (1,2549008)
Sep 12 07:02:36 com24-2-2 syslog: HDXEA: 0
Sep 12 07:02:40 com24-2-2 syslog: HDXEA: 1
Sep 12 07:02:46 com24-2-2 syslog: a: MOcount (0,2523148)
Sep 12 07:02:50 com24-2-2 syslog: a: MOcount (1,2549409)
Sep 12 07:03:34 com24-2-2 syslog: HDXEA: 0
Sep 12 07:03:38 com24-2-2 syslog: HDXEA: 1
Sep 12 07:03:46 com24-2-2 syslog: a: MOcount (0,2523549)
Sep 12 07:03:50 com24-2-2 syslog: a: MOcount (1,2549810)
Sep 12 07:04:32 com24-2-2 syslog: HDXEA: 0
Sep 12 07:04:37 com24-2-2 syslog: HDXEA: 1
Sep 12 07:04:46 com24-2-2 syslog: a: MOcount (0,2523950)
Sep 12 07:04:50 com24-2-2 syslog: a: MOcount (1,2550210)
Sep 12 07:05:30 com24-2-2 syslog: HDXEA: 0
Sep 12 07:05:35 com24-2-2 syslog: HDXEA: 1
Sep 12 07:05:47 com24-2-2 syslog: a: MOcount (0,2524354)
Sep 12 07:05:51 com24-2-2 syslog: a: MOcount (1,2550615)
Sep 12 07:06:28 com24-2-2 syslog: HDXEA: 0
Sep 12 07:06:33 com24-2-2 syslog: HDXEA: 1
Sep 12 07:06:48 com24-2-2 syslog: a: MOcount (0,2524755)
Sep 12 07:06:52 com24-2-2 syslog: a: MOcount (1,2551015)
Sep 12 07:07:25 com24-2-2 syslog: HDXEA: 0
Sep 12 07:07:31 com24-2-2 syslog: HDXEA: 1
Sep 12 07:07:48 com24-2-2 syslog: a: MOcount (0,2525155)
Sep 12 07:07:54 com24-2-2 syslog: a: MOcount (1,2551434)
Sep 12 07:08:24 com24-2-2 syslog: HDXEA: 0
Sep 12 07:08:28 com24-2-2 syslog: HDXEA: 1
  
```

**Figure 51 – COM24 Syslog Report**

In addition to clicking the *Syslog* hyperlink at the top of any COM1000 web interface page, the syslog data may also be accessed directly from the *PairingInfo* screen as discussed in **Section 6.5** by clicking directly on the hyperlinks for each card's IP address, as seen in **Figure 29**.

It should be noted, however, that this particular feature will only give the results shown above if the card you are logged into and the card you wish to access are both running a firmware version higher than ST02.00.03. If a target card is not carrying the correct firmware, you will be redirected to that card's *Help* page.

## 6.12 Using the COM24 ATSC Command

The ATSC command can control Technicolor ATSC tuner boards. There are eight tuners in each board that can receive an ATSC channel and forward the transport stream to a QAM24. There is a different IP address per every two tuners. This results in four different IP addresses per board.

First, the four IP addresses must be set. Specify the desired base IP address (such as 192.168.4.1) and click *IP\_Discover\_and\_Set*. This will discover all of the ATSC tuners and set their IP addresses starting with the base IP address.

Next, enter one line per tuner using this format:

```
HomeRun_IP Tuner_Index RF_Index Major.Minor Dest_IP Dest_Port
```

For example, to tune to WFYI 20-1, 20-2, and 20-3 with

ATSC Base IP address = 192.168.4.1

The Tuner\_Index is either 0 or 1 for each IP address.

WFYI is carried on ATSC frequency 21.

QAM24 address is 192.168.6.2

Therefore enter the following three lines:

```
192.168.4.1 0 21 20.1 192.168.6.2 17
```

```
192.168.4.1 1 21 20.2 192.168.6.2 18
```

```
192.168.4.2 0 21 20.3 192.168.6.2 19
```

## 6.13 Using the COM24 401 Command

The 401 tab can send control messages to DCI401MCS Digital Security Terminator devices (DSTs). The DCI401 can receive Pro:Idiom encrypted QAM channels and output HDMI video to a TV. Each message can be sent to either a single DCI401 based on its unique Receive ID (RID) or to all DCI401s by setting the Receiver\_ID to 0xffffffff.

The Messages are:

- 0 = Download new DCI401MCS software
- 3 = Feature enable/disable
- 4 = Reset DTA user settings (ratings locks, ...)
- 5 = Tune to a specified Major\_Number – Minor\_Number channel
- 6 = Scan for new channels
- 7 = Display text for a few seconds on the TV
- 9 = Set which channel is the EPG channel
- 10 = Set site specific error messages indicating who to call for support
- 11 = Send logo file for use in the user interface

The DCI401MCS will only decrypt Pro:Idiom channels if the channel was Pro:Idiom encrypted by a COM24.



## 6.14 Using the COM24 QAM Command

The *QAM24* link will display the page below:

**DirecTV COM1000** technicolor

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SvsInfo](#), [HealthInfo](#), [EPG](#), [Svslog](#), [ATSC](#), [401](#), [QAM](#)

**EdgeQAM Modulator**

Which EdgeQam (192.168.6.1+chassis):

**Mega-Bits Per Second**

Port = QamChannel \* 16 + QamSubChannel

	PortBase	Chan	-1	-2	-3	-4	total
Qam1	16	30	13.8	2.8	0.9	0.0	17.6
Qam2	32	31	7.8	9.8	15.8	0.1	33.4
Qam3	48	32	2.0	2.8	2.3	0.0	7.1
Qam4	64	33	3.0	1.7	14.6	0.0	19.3
Qam5	80	34	10.6	5.5	0.9	0.0	17.0
Qam6	96	35	4.6	4.5	10.3	0.0	19.5
Qam7	112	36	5.5	6.1	8.8	0.1	20.5
Qam8	128	37	3.5	5.1	0.0	0.1	8.6
Qam9	144	38	9.6	4.7	0.0	0.0	14.3
Qam10	160	39	3.0	7.4	0.0	0.0	10.5
Qam11	176	40	10.4	11.1	0.0	0.0	21.6
Qam12	192	41	7.9	10.5	0.0	0.0	18.4
Total							207.7

**Control**

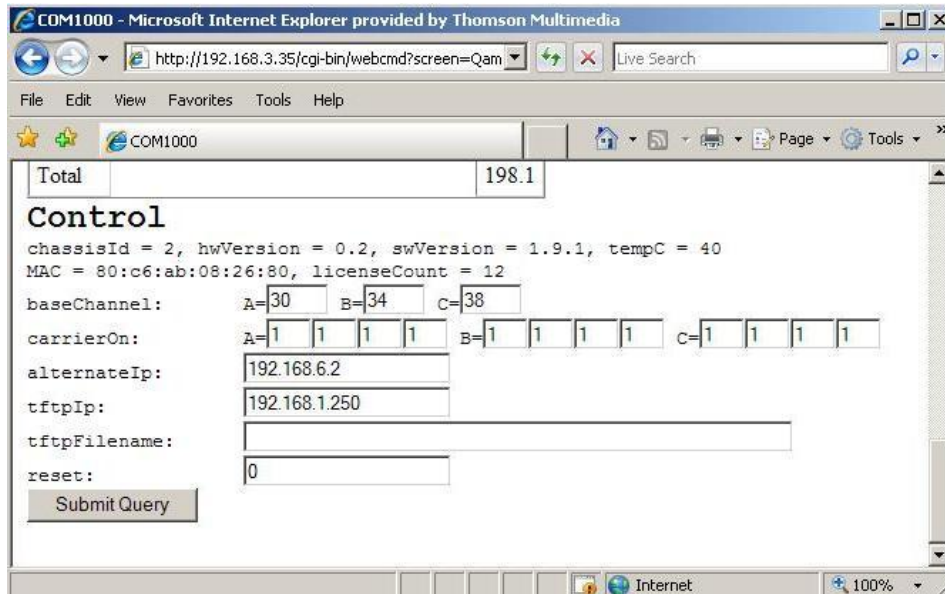
Figure 52 – QAM24 Command Screen (top portion)

The QAM24 card is controlled by any of the COM24 cards via Ethernet. The QAM24 card has a fixed IP address = 192.168.6.“Chassis ID” + 1. An arbitrary alternate address can be assigned.



QAM output channels have a destination port of  $QamChannel * 16 + subchannel\ number$ .

The top screen shows the status of each channel. The RF groups are labeled Qam1-Qam12. Each RF channel can have up to 8 subchannels or programs. If a subchannel is active, its bit rate will be shown. Bitrates are static snapshots.



**Figure 53 – QAM24 Command Screen (bottom portion)**

The bottom screen controls the RF output configuration and provides SW upgrade capability. 12 RF output channels are defined in 3 groups of 4. Each group of 4 is in a fixed channel sequence starting with the base channel. Each group's base channel can be set according to the North American Cable Television Frequency plan. Each RF channel can be individually turned on or off. Each channel must be frequency adjacent and within the same band per the North American Cable Television Frequency Plan (See EIA-542B or <http://www.jneuhaus.com/fccindex/cablech.html>).

The QAM24 supports an emergency broadcast override. If a video stream is sent to port 25600 it will override all of the channels.

The "tftpIP" address field sets the address of the file server for SW upgrades. "tftpFilename" sets the name of the new SW image.

**DO NOT turn off power or unplug a card that is updating its SW image. YOU WILL create a doorstop.**

The reset field executes a SW reset of the QAM24. It is almost user transparent.



The alternateIp field will configure the QAM24 to have a second IP address. This IP address can be a multicast IP address. However, the QAM24 does not notify a managed switch that it wants this multicast IP address via IGMP.

Some QAM24 boards have an RF spur that can interfere with analog television channels. The spur is 1176 MHz minus the desired center RF frequency for each group of four channels. For channels 23 through 94 this means that the spur will be at  $(1086 - 6 * \text{channel})$  MHz. Change the frequency plan to minimize the impact of the RF spurs.

New reduced cost QAM-6 boards will only permit six QAM carriers to be active at a time. To increase the number of QAM carriers, additional licenses must be purchased from Technicolor and downloaded to the QAM24.

When debugging QAM24 issues, click on the qamLog button to see the QAM24 system log. This log is mainly for Technicolor technical analysis but a short summary is:

A = Arp reply

bad(#) = Discarded # number of unexpected Ethernet packets.

C = Command and control message received

c## = Continuity counter error. May indicate multiple channels to same port.

PMT## = PMT changed on a channel

T = PCR discontinuity

## 6.15 Using the COM24 Help Command

The help command can be reached by clicking “Help” at the top of any COM1000 page. It briefly describes all of the other commands.

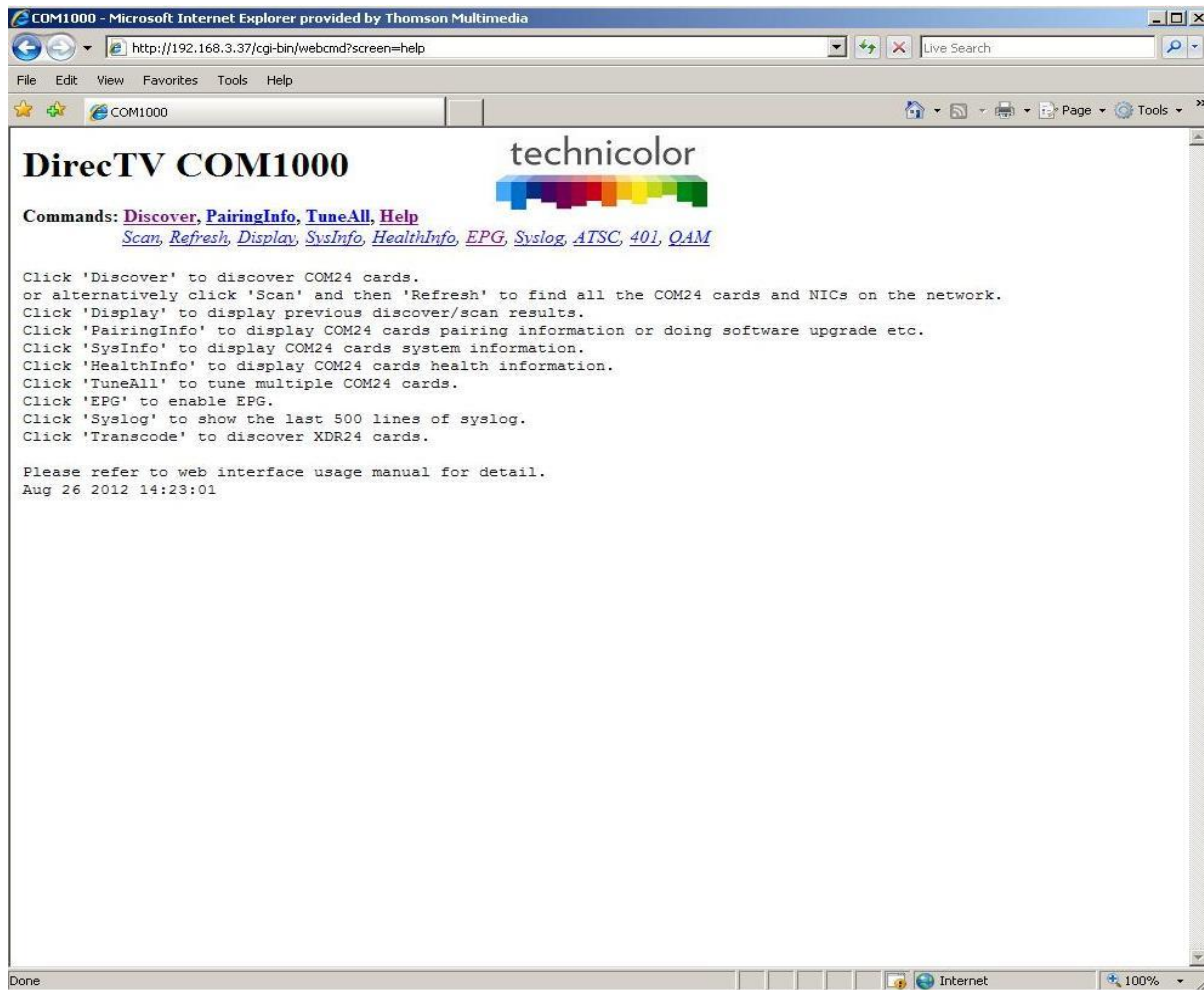


Figure 54 – COM24 Help Command



## 7 COM1000 FIRMWARE UPGRADE PROCEDURES

When you first receive your COM1000 system, your distributor should have already installed the most recent firmware on every COM24 card. However, since we are continuing to improve upon the software associated with the system, you may find it useful to stay up-to-date as future versions are released.

*Note: The latest firmware release covered in this manual is ST02.07.05.*

The following sections will explain in detail the upgrade options that were touched upon earlier within the file transfer utility located under the *Tune* command and on the *PairingInfo* page (*Advanced Tune* for SW version ST02.05.05 and later).

### 7.1 Preparing for a Firmware Upgrade

Before proceeding any further, it is recommended that you first visit **Section 5.2.1** on setting up your network connections and **Sections 5.1.5 and 5.3** on using FTP/TFTP and configuring your server in order to ensure that everything is properly configured to perform this operation.

### 7.2 Upgrading COM24 Firmware

**WARNING: DO NOT** download old software versions (before ST02.07.05) if the RID does not start with 0330. This will cause all three LEDs to blink once a second and the card will not work.

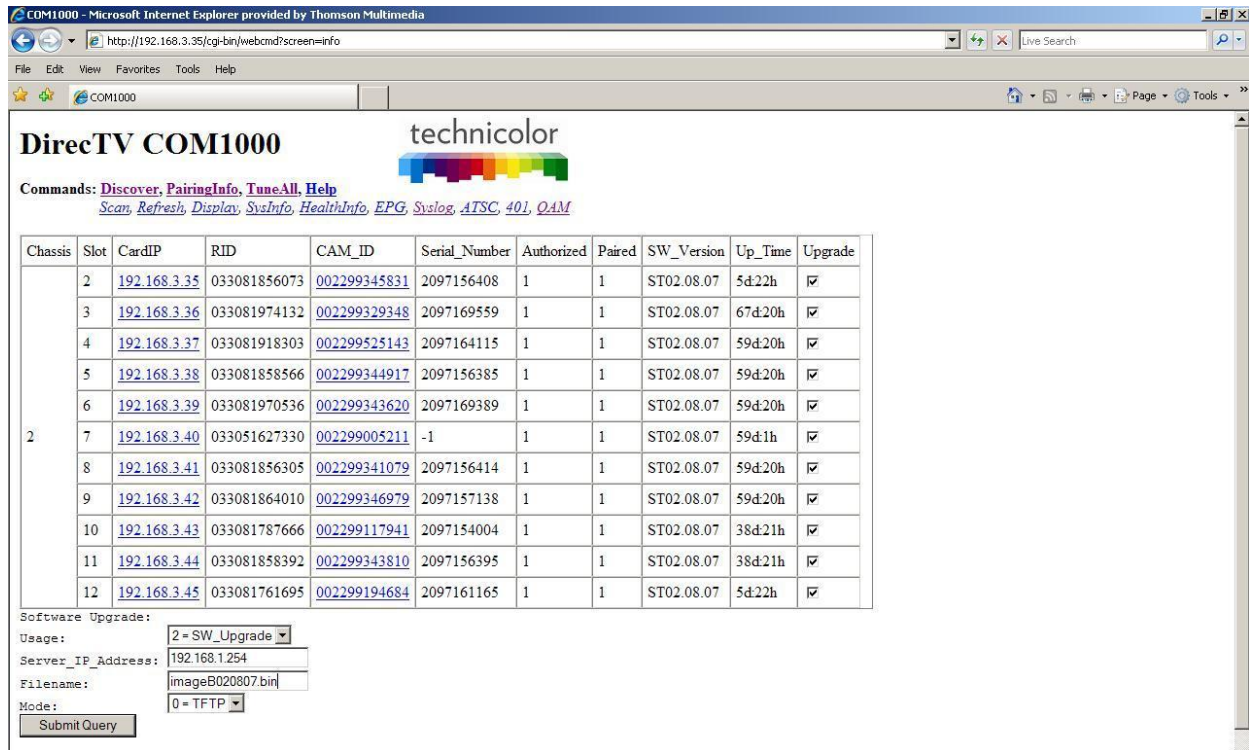
This section will guide you through the procedure for upgrading your COM24 cards. There are two different ways you can go about doing this. The first method is a single-card upgrade, which requires the use of the file transfer utility located on the *Advanced Edit* page (see **Section 6.8.5**). The second and preferred method is a multi-card upgrade, the controls for which are located at the bottom of the *PairingInfo* page (see **Section 6.5**).

For both of these options, the “Usage” option should be on ‘2 = SW\_Upgrade.’ The “IP\_Address” will be the device that contains the upgrade file (your PC). The “Filename” will be the name of the upgrade file (e.g. “imageB020113.bin”). It is recommended that you retain the original filename of the update file you have been issued to avoid confusion later on. The mode determines whether the card tries to contact a FTP or TFTP server.

The fields that apply to the COM24 Multi-card upgrade are listed in **Section 6.5** “Evaluating COM24 Authorization Status.”

If one desires to update all of the COM24 cards in a chassis, then all upgrade fields would be checked as shown in

Figure 55 below.



**DirecTV COM1000**

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Syslog](#), [ATSC](#), [401](#), [QAM](#)

Chassis	Slot	CardIP	RID	CAM_ID	Serial_Number	Authorized	Paired	SW_Version	Up_Time	Upgrade
2	2	<a href="#">192.168.3.35</a>	033081856073	<a href="#">002299345831</a>	2097156408	1	1	ST02.08.07	5d:22h	<input checked="" type="checkbox"/>
	3	<a href="#">192.168.3.36</a>	033081974132	<a href="#">002299329348</a>	2097169559	1	1	ST02.08.07	67d:20h	<input checked="" type="checkbox"/>
	4	<a href="#">192.168.3.37</a>	033081918303	<a href="#">002299525143</a>	2097164115	1	1	ST02.08.07	59d:20h	<input checked="" type="checkbox"/>
	5	<a href="#">192.168.3.38</a>	033081858566	<a href="#">002299344917</a>	2097156385	1	1	ST02.08.07	59d:20h	<input checked="" type="checkbox"/>
	6	<a href="#">192.168.3.39</a>	033081970536	<a href="#">002299343620</a>	2097169389	1	1	ST02.08.07	59d:20h	<input checked="" type="checkbox"/>
	7	<a href="#">192.168.3.40</a>	033051627330	<a href="#">002299005211</a>	-1	1	1	ST02.08.07	59d:1h	<input checked="" type="checkbox"/>
	8	<a href="#">192.168.3.41</a>	033081856305	<a href="#">002299341079</a>	2097156414	1	1	ST02.08.07	59d:20h	<input checked="" type="checkbox"/>
	9	<a href="#">192.168.3.42</a>	033081864010	<a href="#">002299346979</a>	2097157138	1	1	ST02.08.07	59d:20h	<input checked="" type="checkbox"/>
	10	<a href="#">192.168.3.43</a>	033081787666	<a href="#">002299117941</a>	2097154004	1	1	ST02.08.07	38d:21h	<input checked="" type="checkbox"/>
	11	<a href="#">192.168.3.44</a>	033081858392	<a href="#">002299343810</a>	2097156395	1	1	ST02.08.07	38d:21h	<input checked="" type="checkbox"/>
	12	<a href="#">192.168.3.45</a>	033081761695	<a href="#">002299194684</a>	2097161165	1	1	ST02.08.07	5d:22h	<input checked="" type="checkbox"/>

Software Upgrade:

Usage:

Server\_IP\_Address:

Filename:

Mode:

Figure 55 – Multi-card COM24 SW Upgrade

Please note that when executing a multi-card firmware upgrade, the upgrade command will be sent to the leftmost card slot first, and then to each of the cards in succession. As soon as each card finishes its download, it will reset itself. If you have sent the upgrade command from a card within the first several slots, it may be reset before all of the cards in the chassis have received their upgrade commands, in which case the last few cards in the chassis will not be updated. In order to avoid this situation, it is highly recommended that you execute all multi-card upgrades while logged into the COM24 card that inhabits the rightmost slot of any given chassis.

The results of the upgrade in

Figure 55 is shown in Figure 56.

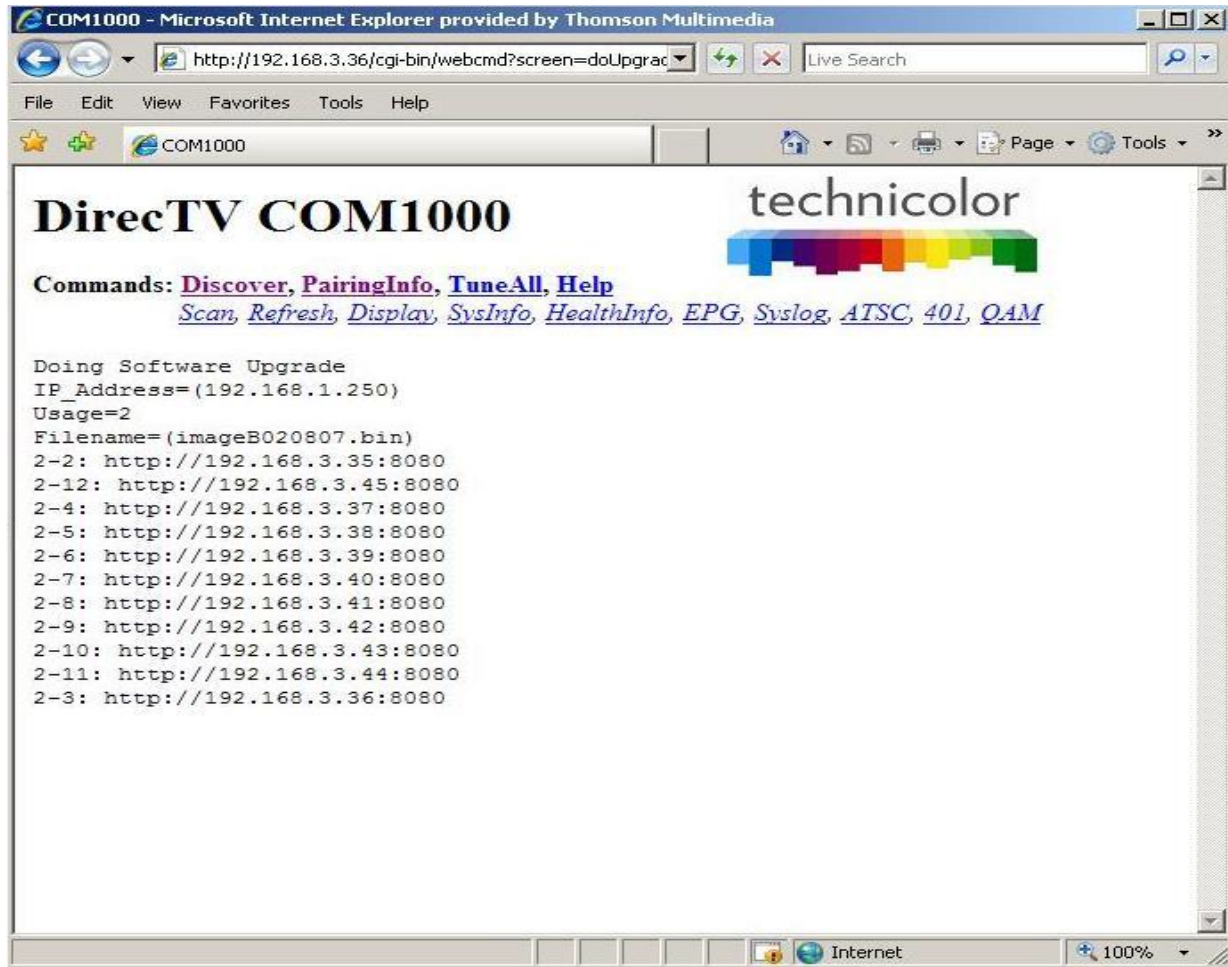


Figure 56 – Multi-card COM24 SW Upgrade Results

### 7.3 Upgrading a FLX24 from SD to HD

Upgrading the FLX24 from SD only (3 channels) to HD (2 channels) requires the purchase of an upgrade license key from Technicolor. To purchase a key, contact your distributor. Once an upgrade license has been purchased, it is applied using the – *COM1000 Pairing Info* Page as shown in **Figure 57** below. To apply a key, an entry is made in the Key Entry text box using the format shown above the text box:

Chassis-slot-tuners RID KEY

The chassis-slot-tuners RID entries can all be cut and pasted from the list above the key entry text box. The KEY value is the key purchased through your distributor. Once all key entries have been typed into the text box, clicking on the Submit Query radio button will apply them. Once a key has been successfully accepted by a COM24FLX card it will revert to two tuner mode and will be capable of receiving HD programming.



**DirecTV COM1000**

technicolor

Commands: [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Scan](#), [Refresh](#), [Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Syslog](#), [ATSC](#), [401](#), [QAM](#)

Chassis	Slot	CardIP	RID	CAM_ID	Serial_Number	Authorized	Paired	SW_Version	Up_Time	Upgrade
2	2	<a href="#">192.168.3.35</a>	033081856073	<a href="#">002299345831</a>	2097156408	1	1	ST02.08.07	3d:21h	<input type="checkbox"/>
	3	<a href="#">192.168.3.36</a>	033081974132	<a href="#">002299329348</a>	2097169559	1	1	ST02.08.07	7d:23h	<input type="checkbox"/>

Software Upgrade:  
Usage:   
Server\_IP\_Address:   
Filename:   
Mode:

**RID and CAM ID List**  
chassis-slot-tuners RID CAM\_ID  
2-2-2 033081856073 002299345831  
2-3-2 033081974132 002299329348

**Key Entry**  
Enter list of chassis-slot-tuners RID KEY

Figure 57 - COM24FLX *PairingInfo* screen

## 7.4 Upgrading QAM24 Firmware

Upgrading the firmware for the QAM24 is similar to updating the firmware for the COM24 and XDR24 except for the following differences:

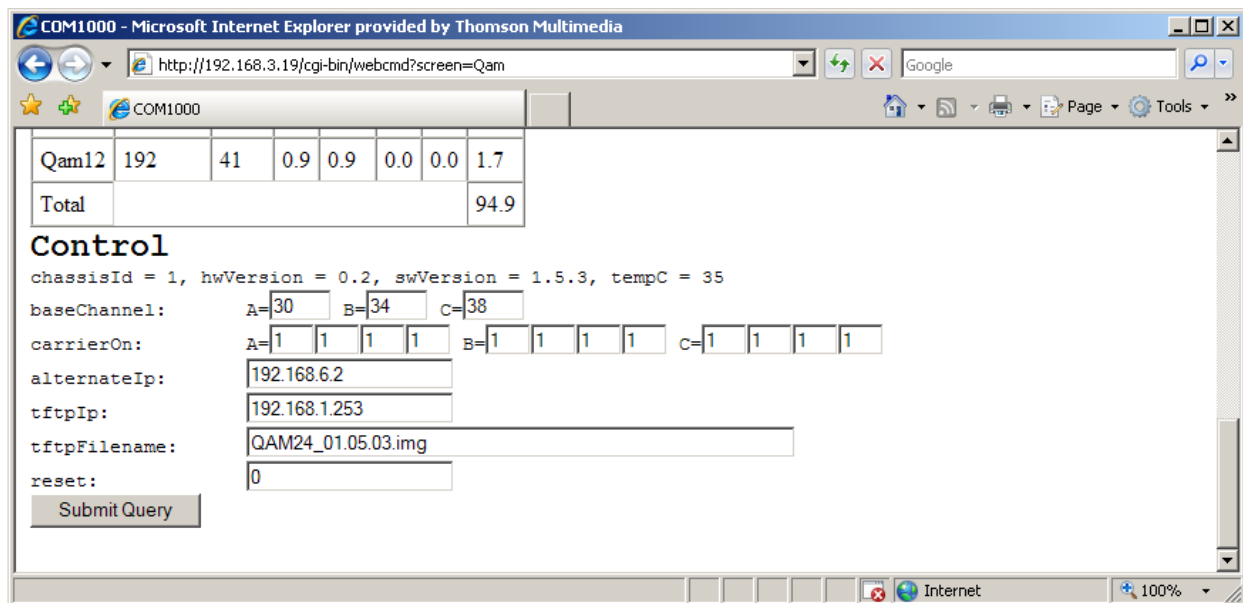
- QAM24 upgrade is tftp only. Ftp is not available.



- Only one QAM24 can be updated at a time.
- QAM24 does not automatically reset after the new SW is downloaded. It must be manually reset by depressing the recessed reset button on the front of the card.

To perform the SW update, first access the QAM command as shown in **Figure 52** in **Section 6.14**. At the bottom of the page are the fields necessary for the SW upgrade (**Figure 53**). **Figure 58** below shows those fields filled in as an example upgrade.

The “tftpIP” will be the IP address of the device that contains the upgrade file (your PC). The “Filename” will be the name of the upgrade file (e.g. “QAM24\_01.05.03.img”). It is recommended that you retain the original filename of the update file you have been issued to avoid confusion later on. The reset field only causes a soft reset. The card needs a hard reset after the new SW is loaded.



**Figure 58 – QAM24 SW Upgrade**



Figure 59 shows the results of starting a QAM24 SW upgrade.



Figure 59 – QAM24 SW Upgrade Results

## 8 COM1000 DIAGNOSTIC CAPABILITIES






When it comes to troubleshooting your COM1000 system, the COM24 card has a few built-in mechanisms that can assist you. Each of these can be very helpful in diagnosing general issues associated with system status and card connections that will be covered in the following sections.

### 8.1 Indicator lights

The three indicator lights on each COM24 faceplate have multiple functionalities. In addition to providing a manual toggling ability by utilizing the LED controls on the *Tune* page (as described in **Section 6.8.4**), the lights also exhibit a set of predefined behaviors for several conditions.

In recognizing the behaviors associated with the three indicator lights, you must first familiarize yourself with the five possible LED states. **Table 3** below names and describes them, and provides a color by which the states will be defined in the following sections.

**Table 3 – LED States**

	<b>On</b>	The LED emits a steady green light.
	<b>Off</b>	The LED is not lit at all.
	<b>Flash</b>	The LED exhibits an on-off pattern once a second.
	<b>Slow Flash</b>	The LED exhibits an on-off pattern once every two seconds.
	<b>Rapid Flash</b>	The LED exhibits an on-off pattern multiple times a second.

#### 8.1.1 Power Supply Issues

Unless a COM24 card has intentionally been removed from the COM200 chassis, the “PWR” light on every card in the system should be lit. If none of the COM24 LEDs on a chassis are lit, the power supply has likely been disrupted. Check for the following:

- ✓ The AC cords on each module are completely attached and plugged in.
- ✓ Both modules are locked in place.
- ✓ The power supply fans are running.

If the above conditions have all been met and you still do not see any LEDs lit, there is probably an issue with your system. There have been instances observed where a system will experience a

“brown-out”, effectively disabling both power supplies. If this is the case, unplugging the system and plugging it back in may remedy the situation.

More commonly, you may see unlit LEDs on one or multiple COM24 cards, but not the whole chassis. Things to check for when this situation occurs:

- ✓ All COM24 cards are fully aligned in their grooves.
- ✓ All COM24 cards are properly connected to their receivers on the back panel.
- ✓ All thumbscrews are tightened completely.

If any COM24 cards remain unlit after ensuring that all of these conditions have been met, there may be something wrong with the cards.

### 8.1.2 System Startup

It is important to understand the behaviors associated with the execution of normal procedures before you can effectively diagnose any card issues. This section covers the sequence of events that occur in a COM1000 system at boot-up.

The COM24 card goes through four steps at startup:

1. Self test
2. IP Initialization (obtain IP address, establish network connectivity)
3. DIRECTV Program Guide acquisition
4. Channel acquisition and video streaming

The COM24 cards take between 2 and 3 minutes to reach a fully functional state after a reboot or power-up. The status of the card can be tracked during this time by observing the behavior of the LEDs. Normal LED behavior during startup is listed below in **Table 4**.

**Table 4 – LED Startup Behavior**

Condition	Tuner 1 LED	Tuner 2 LED	PWR LED	Approx. duration
Self-test and initialization	ON	OFF	OFF	30 sec
Searching for guide data	ON	OFF	SLOW FLASH	120 sec
Normal operating conditions	ON	ON	ON	

*Note: It is normal for the Tuner LEDs to turn on and off during boot-up.*

If the guide acquisition state (flashing PWR LED) lasts longer than expected without the Tuner LEDs turning on, then the system is probably having difficulty acquiring the APG (Advance Program Guide). In this case, it is recommended that the installer verify proper and healthy RF levels being fed into the COM120 RF Distribution panel. The card may appear to “forget” its old settings during this time, but they should reappear once the situation has been remedied.

Upon successful boot-up, a COM24 will revert to its previously configured channel lineup. The lineup is specified either by the external control server (if applicable) or automatically from the cards themselves if the persistence setting was enabled when the system was configured (persistence is disabled by default).

### 8.1.3 Normal Operation

When operating under normal circumstances, there are a few characteristics you can expect to see in LED behavior. The first is that the PWR LED should always be lit when surrounded by favorable weather conditions. Some behavior, although not desirable, is still considered normal. During rainstorms or other conditions that may obstruct satellite communications, the receiver may lose contact and be unable to receive guide data. At this point, the PWR LED will start flashing, and the tuners may turn off.

A Tuner LED can take on one of three behaviors. The state you will see the Tuner LEDs in most frequently is the **ON** state. A tuner whose LED is on can be interpreted as being “locked on” to a certain satellite and, providing you qualify to receive the programming, should be streaming video on the specified channel. The COM24 cards will maintain a lock on the signal at all times if the signal strength and quality is within specifications (-25 to -55 dBm per transponder).

A flashing Tuner LED indicates that the tuner is locked on to a satellite but it cannot stream video. This is most likely to occur when you are trying to tune to a channel that DIRECTV provides and you are capable of receiving, but you have not purchased the content streaming on that channel. This can also happen if a B band converter has stopped working.

A tuner whose LED is off is not locked onto anything. This most likely indicates that the tuner is not set to stream anything. It could also mean that the card could not find the channel specified, in which case you should check for the following:

- ✓ The channel is one that DIRECTV actually provides.
- ✓ You have entered the channel number correctly.
- ✓ You are qualified to receive the channel.

If, after having reviewed the above checklist, the tuner LEDs are not lit when they are expected to be, or if the PWR LED begins flashing at any point other than under inoperable weather conditions, it may be an indication that there is something wrong with the integrity of the RF signal between the satellite dish and the COM1000.

### 8.1.4 Software Upgrade

There are two phases to the COM24 software upgrade sequence. The initial phase is referred to as the bootloader, and it is at this time that the card evaluates requests for a software upgrade. The second phase, also known as the updater, is when the new code is downloaded, authenticated, and installed to the card.

During the initial phase of the software upgrade procedure (the bootloader), a COM24 first evaluates requests for software updates and then verifies that the code to be installed is indeed a valid COM24 software release. During the bootloader phase, the status can be determined by evaluating the LED states according to **Table 5** below.

**Table 5 – LED Behavior during Normal Upgrade**

Condition	Tuner 1 LED	Tuner 2 LED	PWR LED
Upgrade initiated.	OFF	OFF	OFF
Initializing bootloader...	ON	ON	ON
Uploading file...	OFF	OFF	RAPID FLASH
File received. Authenticating code...	RAPID FLASH	OFF	RAPID FLASH
Successful authentication. Writing to memory...	RAPID FLASH	OFF	FLASH
Upgrade successful! Card will reboot shortly.	ON	ON	ON

*Note: The PWR LED may flash briefly at the start and/or end of the upgrade.*

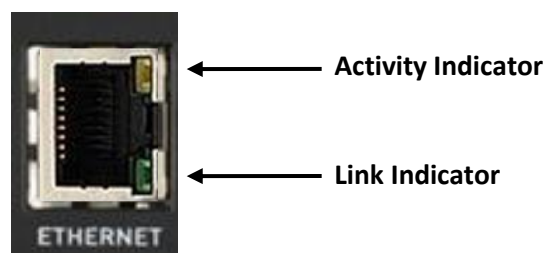
If you see a behavior not described above in conjunction with a failure to complete the update, it may be an indication that something has gone wrong with the update. You should check that you are following each of these guidelines before attempting another update.

- ✓ All system/PC connections are functioning correctly.
- ✓ The TFTP server is running on the PC handling the update.
- ✓ The TFTP server is fully configured and pointing to the folder containing the update.
- ✓ You have entered the correct destination IP for the PC handling the update.
- ✓ You have correctly entered the update file name.

- ✓ The directory path and filename do not exceed the maximum limit of 200 characters.

## 8.2 Network Connectivity Indicators

The Ethernet jack on the face of the COM24 and XDR24 cards contain two LEDs. The upper one is a yellow-orange color and it indicates whether video is flowing from the card. The lower one is a bright green color, and it indicates whether the Ethernet port is actively linked with another. Refer to **Figure 60** below for an illustration of these LEDs.



**Figure 60 – Network Connectivity Indicator LEDs**

When utilizing the Ethernet port on the face of the COM24 card, the “Activity” indicator should be flashing multiple times a second, and the “Link” indicator should always be steadily lit under normal operating circumstances.

When a COM24 card is connected to a XDR24 card, the COM24 should behave as described above. The XDR 24, meanwhile, should exhibit both a steadily lit “Activity” indicator and a steadily lit “Link” indicator.

If the “Activity” indicator is dark or only flashing slowly but the “Link” light is on, then the card is not transferring video data. If the COM24 Tuner LEDs appear locked, then the card should be reset. Resetting the card can be done via the front panel reset button, or via the “Reset” function under the *Tune* link on the web interface.

If the indicator lights exhibit some unexpected behavior that is not described above and you have already tried resetting the cards, please contact your distributor for assistance with troubleshooting the system.



## 9 DIRECTV AUTHORIZATION

Like any other DIRECTV receiver, all COM24s require authorization from DIRECTV before they will function properly. Each COM24 receiver in each COM200 chassis should be authorized individually by the System Integrator. Without this authorization, the cards will not be able to stream video programming from the DIRECTV satellites.

In order to have each card authorized by DIRECTV, you will need to know both the Receiver ID (RID) and Conditional Access Module (AKA smart card) ID (CAM ID) numbers. In addition to being provided on the *PairingInfo* page, the RID and CAM ID are printed on the outside packaging of the COM24 box and on an informational sheet inside the system packaging. The information is also located and maintained by the system integrator.

Please take into account the following recommendations before calling in for card authorization. First, ensure that the system is fully installed and that the RF signals for each card are properly balanced. Next, tune each card you are requesting authorization for to channel 100, and confirm that each tuner correctly displays that channel. You should have the account number and the RID, CAM ID, and serial numbers for each card readily available at the time you call in.

Authorization of a COM24 card is identical to that of a set-top box. Simply boot the system up, verify that the system is successfully collecting guide information, and then call the required information into the DIRECTV call center. It should be noted that DIRECTV currently processes all HD programming in a batch-mode process, so it may take up to 24 hours for your COM24 cards to receive the appropriate authorization hits.

*Note: Some cards have been known to reboot once they have received an authorization hit.*

At the time of launch, there is no reliable way to determine if a COM24 card is authorized without accessing the card's web interface. The COM24 cards evaluate their authorization status at the time a channel is tuned, and will retain that information as long as the card stays on. Therefore, it will be necessary to retune the cards once they have been authorized by DIRECTV.

If the desired programming has already been fully configured, this can be easily accomplished in a single step. Simply copy the current tuning table provided at the bottom of the *TuneAll* screen and paste it into the text field provided. At this point, you may make any changes necessary. Just click the **Submit Query** button when you are finished. The authorized cards should be able to stream the desired content. If they do not, check the CAM log for any new error messages.

Under normal circumstances, the COM24 cards in the COM1000 system should never lose their authorization. However, like a normal DIRECTV set-top box, if a card is left unconnected from the DIRECTV network for an extended period, it will lose its authorization.

## 10 GENERAL TROUBLESHOOTING TIPS

The most common problems encountered with the COM1000 systems are due to bad or loose connections. Before moving on to detailed troubleshooting of any problem, you should check whether all necessary connections (power supply, Ethernet, and coaxial cables) are fully plugged or screwed in, and that all cards are fully inserted. Once you have ensured that everything is tightly secured, try retuning and/or rebooting any problematic cards. If the problem persists, look over the following tips and review the appendices before contacting your distributor.

### 10.1 Testing Video without Pro:Idiom Encryption

You may find it necessary at times to test a card's ability to stream video. If you do not have a Pro:Idiom enabled television readily available in the system area, this may prove difficult. In this case, you have two options to stream video elsewhere with limited capabilities. With the right equipment, you can send video to a standard television, or you can send video directly to your PC.

#### 10.1.1 Streaming Video to a Standard Television

If you happen to have access to a television in the test area that will be capable of playing the specified video stream, it is possible to set up a system that will allow you to troubleshoot without using Pro:Idiom. It should be noted, however, that the settings required to setup such a system do not allow you to view any programming besides DIRECTV channel 100.

1. Under the "Tune" interface on the *Tune* page (refer to **Section 6.8.1**), set the "IP\_Address" to the edge QAM as you normally would.
2. Set the edge QAM to stream on the channel of your choice according to the specifications for your particular device. Use whatever settings you need to ensure that the video will stream to a valid channel on your television.
3. Set the "Major\_Number" field to channel 100. This is the only channel on which customers have the option of removing Pro:Idiom encryption.
4. Set the "Security\_Mode" field to '0 = None'. Again, this will only work on DIRECTV channel 100.
5. Turn your television to the channel you specified earlier on, utilizing any other devices necessary to complete the system (such as an Enseio box).

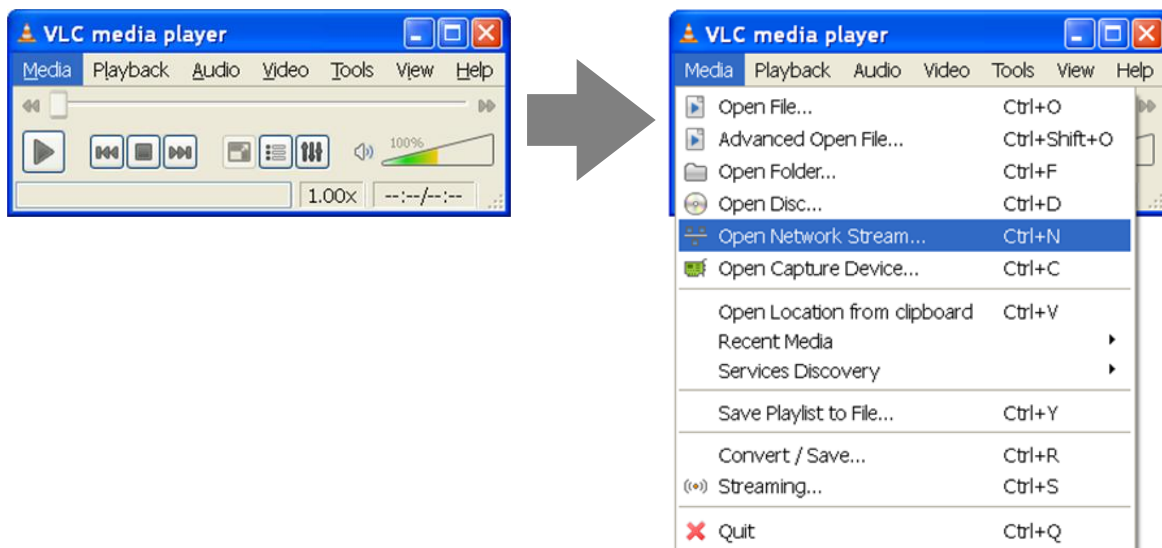
### 10.1.2 Streaming Video to your PC

If you prefer to use a PC during troubleshooting, the only thing you need is an application like **VLC Media Player** (as covered in **Section 5.1**). The instructions for configuring your PC to stream video from the COM1000 using the **VLC Media Player** application are included below.

First, you will need to tune the COM24 card you are testing to stream to your PC. The instructions for doing so follow.

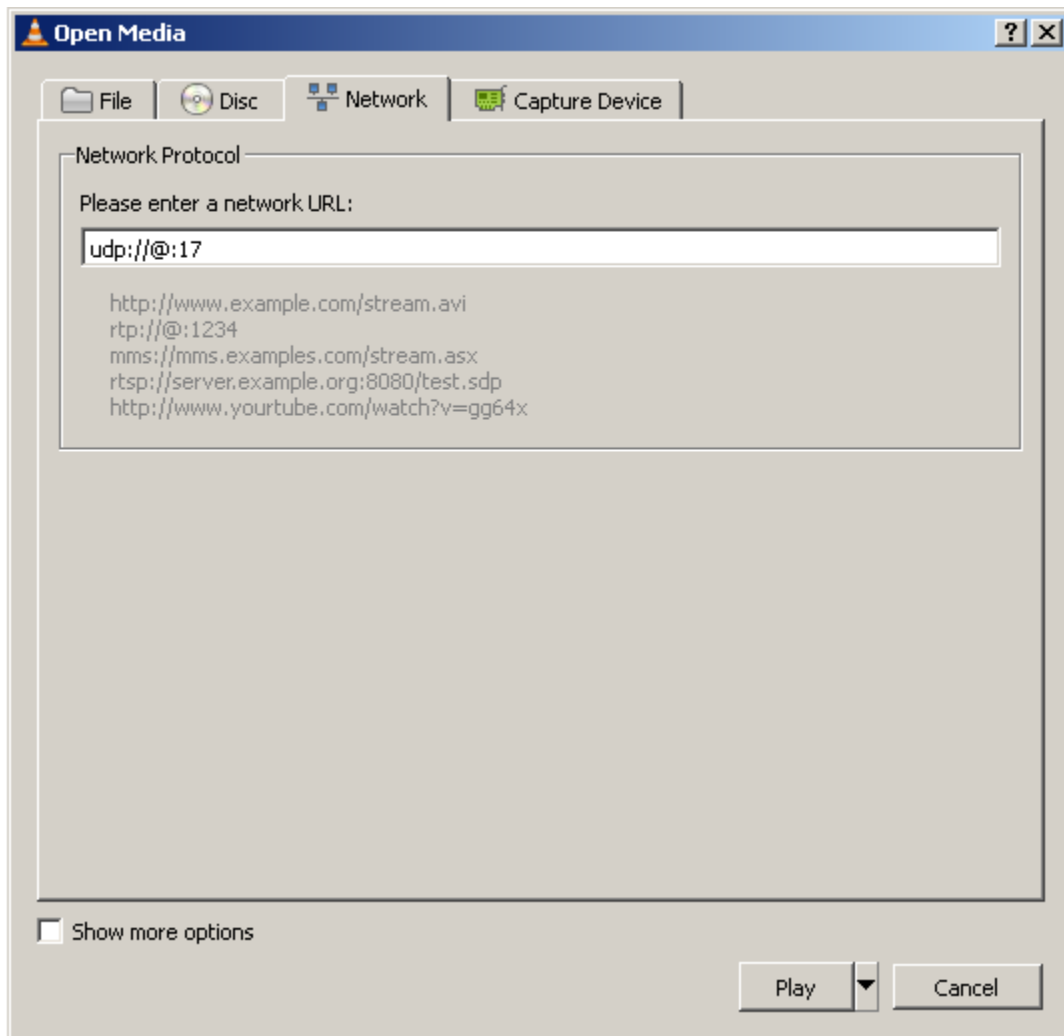
1. Under the “Tune” interface on the *Tune* page (refer to **Section 6.8.1**), set the “IP\_Address” field to your PC’s address (refer to **Section 5.3.1** for instructions on detecting your computer’s IP address).
2. Make note of which value the “Port\_Number” field is set to. If you have already configured the system, you can leave this value on its previous setting. If you have not, select a default value for troubleshooting that will not conflict with the port number of any of the other cards.
3. Make sure the “Protocol\_Type” field is set to ‘0 = UDP’.
4. Set the “Major\_Number” field to channel 100. This is the only channel on which customers have the option of removing Pro:Idiom encryption.
5. Set the “Security\_Mode” field to ‘0 = None’. Again, this will only work on DIRECTV channel 100.

Next, open up **VLC Media Player**. Select “Media” from the main menu, and then select “Open Network Stream” from the dropdown menu that appears (see **Figure 61**).



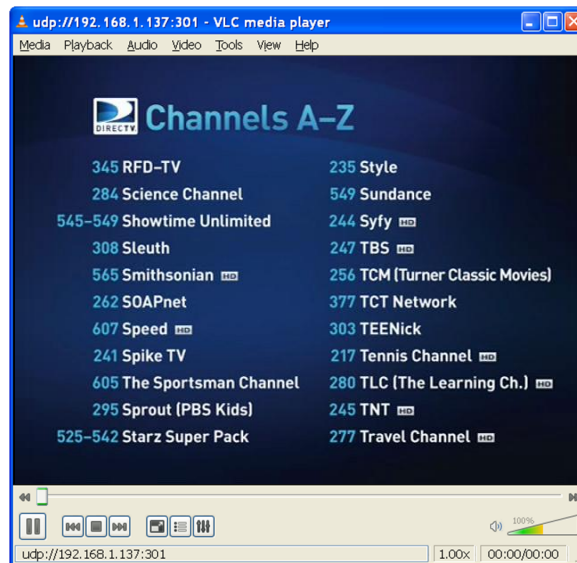
**Figure 61 – Configuring VLC Media Player**

In the new window (see **Figure 62**), set the network URL to something like “udp://@17”, where “udp” stands for the UDP protocol, “@” stands for your PC, and 17 is the port number. The “//” and “:” are delimiters. Set the “Port” field to the value you were asked to note earlier during setup.



**Figure 62 – Opening a Network Stream**

If you have set up all your connections as directed, *VLC Media Player* should start streaming video output from channel 100. The resulting screen should look similar to the one shown in **Figure 63**.



**Figure 63 – Streaming Video from a COM24 Card**

## 10.2 Preventing Pro:Idiom key loss

Each commercial TV that supports Pro:Idiom decryption must contain a copy of the secret Pro:Idiom decryption keys. These keys can be corrupted which will prevent the TVs from decrypting Pro:Idiom encrypted video until the TV is re-keyed. The main way that Pro:Idiom TVs lose their keys is as follows:

A Pro:Idiom encrypted channel is being watched. The Pro:Idiom keys are sent on a different PID for each video channel. The TV is asked to change channels to a different QAM carrier which causes the TV's tuner to receive a different transport stream. This new transport stream contains non-Pro:Idiom key packet on the same PID that previously contained Pro:Idiom key packets. These are normally audio packets. The Pro:Idiom chip incorrectly interprets these audio packets as Pro:Idiom key packets. This confuses the Pro:Idiom chip and causes it to lose its keys.

The QAM24 modulator solves this problem by automatically moving only the Pro:Idiom key packets to a high PID range that is only used for Pro:Idiom key packets. If a non-Technicolor piece of equipment is sending packets in the high PID range that overlaps the Pro:Idiom key PIDs then contact Technicolor for how to modify the QAM24's Pro:Idiom key PIDs.

To minimize the possibility of Pro:Idiom key loss when using other QAM modulators, the COM24 will only output a single audio stream. To enable a second audio stream set the Stream\_ID to 54000.



## 10.3 Changing the Input

If a particular channel in the system is not playing, the first thing you should do is to ensure that your RF signal strength is outputting appropriate values. Next, try resetting the card. If the problem persists, you need to determine whether the video feed is glitchy or if you are working with faulty equipment. Locate the problematic tuner and go over the following steps.

1. Tune to the faulty channel on another tuner that is known to be functioning. If video still isn't streaming, there is probably an issue with the satellite feed. If the channel does work, it may indicate a problem with the tuner.
2. Try tuning to another known working channel on the problematic tuner. If this doesn't work, you may have a faulty tuner connection. If it does, the card may have encountered a problem in fetching guide data, and you should try resetting it.
3. Switch the coaxial cable from an operational tuner onto the faulty tuner. If this causes video to start playing, you may have a faulty B band converter. If it does not, there is probably an issue with your tuner, and you should call it in.
4. Switch the coaxial cable coming from your RF distribution panel to another known working switch. If this works, you may have a problem with your multiswitches and should call the manufacturer.

## 10.4 Verifying Card Authorization

If multiple channels in the system are not playing, check for the following.

1. Locate the tuners that are causing the problem. For single tuners on multiple cards, follow the procedures located above in **Section 0** for each tuner.
2. If both tuners on a single card are malfunctioning, you may first want to check that card's authorization status. If either the "Authorized" or "Paired" columns on the *PairingInfo* page (see **Section 6.5**) display a '0', the card is not yet authorized.
3. If the "Authorized" and "Paired" columns both display a '1', check the card's CAM log (see **Sections 6.5 and 6.8.7** on accessing the CAM log) for any "Card not Authorized" error messages.
4. At this point, you may want to call DIRECTV to confirm your card's authorization status. If the card's authorization status is sound, you should try following the procedures located above in **Section 0** for both faulty tuners.
5. For any cards with authorization problems, see **Section 9** for best-practice procedures in having your card authorized or reauthorized before calling DIRECTV.

## COM24 IP Configuration Considerations

The COM24 cards have a lot of flexibility when it comes to selecting an IP addressing scheme to use on your COM1000 system. This flexibility can be very helpful in making sure you get the optimal IP configuration for your installation, but it also has the potential to make the system non-operational if care is not exercised when changing these parameters. If the front Ethernet port is connected, the back Ethernet port will be disabled.

This section is intended to give you a more comprehensive understanding of the IP assignment modes in order to minimize the risk of this happening. Following a basic description of the IP assignment operation is a walkthrough for each mode setting, as well as general guidelines for when to select a certain mode over another, in addition to examples of what IP address may be assigned to a card in each case.

### A.1 INTRODUCTION

Before getting into the details of configuring your COM24 IP addressing scheme, it is essential that you understand the basic functionality of the COM24 IP assignment algorithm. This information is provided to explain some oddities you may encounter when observing the COM24 card's behavior at boot-up.

The following steps describe generally what happens to a card during a normal boot cycle:

1. Early on in the boot cycle, the COM24 card will perform a DHCP request and store an initial IP address.
2. If you have selected a mode that is not dependent upon a DHCP server, the card will overwrite this address once it comes fully online.

As a result of this series of operations, you may notice that the cards' IP addresses will appear to change as they progress through the boot cycle. Consequently, you should disregard any IP address reported until the card is fully booted.

The following sections will describe each of the fields available in the "User Config" section of the *Advanced Tune* page. It is important to note that the COM24 cards' IP addresses are only assigned at boot-up and that you must reset the cards in order for any changes to take effect.

## A.2 IP\_CONFIG

The **IP\_Config** field allows you to select one of nine possible modes for assigning IP addresses to the COM24 cards. A detailed description of each of these modes is given below.

### *0 = Default*

This mode is programmed into the cards during the manufacturing process. In this mode, each card generates a unique IP for itself using the following formula:

$$192.168.3.[ 1 + ( Chassis\_ID \times 16 ) + Slot\_ID ]$$

**Example:** The card in slot #1 of chassis #1 is assigned an IP address of 192.168.3.18.

It is important to note that the COM24 cards do not possess a “default” IP address, and this mode will not restore a card’s original IP address in the event that a mistake is made when changing these settings.

### *1 = DHCP\_Persistent*

*This is the setting recommended for any COM1000 system that is installed on a network expected to contain a DHCP server.*

This mode will ensure that the cards will always have the same IP addresses, as each card will store the initial IP address assigned to it in its memory and request the same address from the DHCP server every time it reboots.

Because this mode stores the card’s DHCP address to non-volatile memory, you may choose to allow a DHCP server to assign unique IP addresses to the cards only during the initial configuration process. The cards will continue to use these addresses after this initial assignment even if there is no permanent DHCP server in the network.

If this mode is used and the system is initially set up in the absence of a DHCP server, be aware that if they are ever rebooted in the presence of a DHCP server, the cards will interpret it as being the “initial” setup and will be assigned new IP addresses. In this case, you will lose communication with the COM24 cards until you reconfigure your computer’s IP interface so that it resides on a subnet compatible with the cards’ new IP addresses.



**2 = Do not use**

**3 = Do not use**

**4 = Fixed**

This mode is designed to give you the ability to “hard-code” the IP address of each COM24 card in your system. This mode gives you the luxury of controlling what IP addresses are assigned to each card, and works the same way regardless of whether or not a DHCP server is present.

If you wish to use this mode, you must define a “Base\_IP” address. The COM24 cards will then store this value in memory and use it as the new IP address upon the next reboot. Be prepared to use extreme caution when using this mode, as you must take care to account for every IP address in the network and ensure that there are no duplications.

The most widely used implementation for this mode is to simply copy the existing value in each card’s “CardIP” field into its “Base\_IP” field, then set the mode to **Fixed**, and reboot it. This will ensure that the card will always come back up with the IP address currently assigned to it. You must be careful, however, to ensure that each COM24 card has a unique IP address. This is especially easy to overlook in installations that contain multiple COM200 chassis, so it is recommended that you assign each Chassis a unique ID via the dipswitches on the backplane before proceeding (see **Section 4.1** on setting up multiple chassis).

**5 = Do not use**

**6 = Do not use**

**7 = Do not use**

**8 = NoChange**

This setting does not actually represent a separate mode, but rather acts as a way to tell the COM24 card that you would like it to continue using whatever mode it is currently using. For example, you could use this selection to tell a card that is already using **Fixed** mode that you want it to start using a different IP address by selecting this option and entering a different value into the “Base\_IP” field.

### A.3 BASE\_IP

The **Base\_IP** field tells the COM24 card what IP address to use in mode *Fixed*.

In order to ensure a level of uniformity across all of your COM100 installations, it a good practice to assign addresses for the cards in the 192.168.1.xxx or the 192.168.3.xxx subnets.



#### A.4 SUBNET

The **Subnet** field tells the COM24 card what subnet mask to apply to the IP address it generates. This field is optional and, if left blank, the COM24 will not apply any subnet mask.

If the subnet mask is incorrectly set, it may not be possible to talk to the card. To force the card to reset the subnet to the 255.255.0.0 default, reboot the card four times each time waiting for the power LED to flash before rebooting.

#### A.5 GATEWAY

The **Gateway** field tells the COM24 card what default gateway to apply to the IP address it generates. This field is optional and, if left blank, the COM24 will not apply a default gateway.

## RF Sanity Check

In order to address the situation where a receiver loses its authorization every 3 to 4 days, we recommend that installers perform a spot check to verify that the COM1000 can successfully tune to each of the satellite/transponder pairs where the DIRECTV program guide updates can be found.

As a final check to confirm that correct RF signal levels are being received by the COM24 cards, the following table summarizes “typical” SNR and AGC values that must be received to ensure proper operation of the COM1000. It should be noted that this table is only valid for the CONUS (Continental United States) feeds. The guide data for local channels is located elsewhere on the 101 satellite.

**Table 6 – RF Spot Check Values**

DTV Channel	Sat network	Freq. Index	SNR	AGC <sup>3</sup> (dBm)
229	0 (101 sat)	26	≥10	-55 to -25
230	0 (101 sat)	31	≥10	-55 to -25
427	3 (119 sat)	30	≥10	-55 to -25

*Note: These are all of the frequencies where DIRECTV Program Guide updates and CAPs are received. Having signal problems here can cause channels to be missing from the program guide, causing general system instability and resulting in authorizations being missed or dropped after several days.*

<sup>3</sup> Although named AGC, this value is essentially the power level at the input of the COM24 card.

## Troubleshooting the COM1000

Problem/ Condition	Possible Interpretations	What to do
PWR LED continues to flash for more than 2 minutes after reboot	<ul style="list-style-type: none"> <li>• Card is still searching for guide. Communication with card may be unreliable until guide data is acquired.</li> </ul>	<ul style="list-style-type: none"> <li>• If the current weather conditions are favorable, it is recommended that the installer revisit the RF installation guidelines.</li> </ul>
Tuner LED is unlit / SNR = 0 / AGC = -140	<ul style="list-style-type: none"> <li>• Tuner is not locked to a channel.</li> <li>• Card rebooted with “Persistent” field set to ‘0’.</li> <li>• Possible RF problems.</li> <li>• Possible guide acquisition problems.</li> </ul>	<ul style="list-style-type: none"> <li>• Attempt to retune to the channel.</li> <li>• Make sure “Persistent” field is set to ‘1’.</li> <li>• Revisit the RF installation guidelines.</li> </ul>
SNR = 5/ AGC = -17	<ul style="list-style-type: none"> <li>• Inadequate RF quality level.</li> <li>• Signal strength is too high.</li> </ul>	<ul style="list-style-type: none"> <li>• As these conditions could lead to card instability, it is recommended that the installer revisit the RF installation guidelines.</li> </ul>
Tuner LED is lit, but orange LED on the Ethernet flashes slowly	<ul style="list-style-type: none"> <li>• Card is not streaming video.</li> <li>• Card is attempting to send to an unreachable IP address.</li> <li>• Possible authorization problem.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify that the destination IP and port number values are correct.</li> <li>• Check the CAM log for authorization problems. If found, tune to channel 100 and attempt reauthorization.</li> </ul>
Tuner LED is blinking	<ul style="list-style-type: none"> <li>• Tuner is locked but no video packets are being sent.</li> <li>• Possible authorization problem.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the CAM log for authorization problems. If found, tune to channel 100 and attempt reauthorization.</li> </ul>
All three LEDs are blinking once a second	<ul style="list-style-type: none"> <li>• The RID is outside of the expected range.</li> <li>• Software before 02.07.03 was loaded on new cards with a RID that didn’t start with 0300.</li> </ul>	<ul style="list-style-type: none"> <li>• Send card to Technicolor.</li> </ul>
Channel = 0	<ul style="list-style-type: none"> <li>• Card has not fully booted yet.</li> <li>• An invalid Channel Object ID has been entered.</li> <li>• Guide acquisition problem.</li> <li>• Local channel acquisition problem.</li> <li>• If left in this state for too long, the card will lose authorization.</li> </ul>	<ul style="list-style-type: none"> <li>• Wait for the PWR LED to stop flashing.</li> <li>• Reboot the card to force it to get new guide data and then attempt to retune it.</li> <li>• Check the CAM log for authorization problems. If found, tune to channel 100 and attempt reauthorization.</li> </ul>



Problem/ Condition	Possible Interpretations	What to do
IP Address = 192.168.0.0	<ul style="list-style-type: none"> <li>• Card has not fully booted yet.</li> <li>• An invalid IP destination was entered.</li> <li>• Card rebooted with Persistent set to '0'.</li> </ul>	<ul style="list-style-type: none"> <li>• Wait for the PWR LED to stop flashing.</li> <li>• Verify the configuration settings.</li> <li>• Try reprogramming the card, making sure to set Persistent set to '1'.</li> </ul>
All tuners locked to 99B channels lock and unlock simultaneously, but only for a few seconds at a time.	<ul style="list-style-type: none"> <li>• RF Interference from certain 2-way radios can overpower the B band converters, causing tuners to lose lock briefly.</li> </ul>	<ul style="list-style-type: none"> <li>• Due to its transient nature, no solution has been identified.</li> </ul>
Card required multiple authorization "hits"	<ul style="list-style-type: none"> <li>• Possibly nothing – it could just be a function of the way the authorization queue works</li> <li>• Possible RF problems</li> <li>• Possible guide acquisition problems</li> </ul>	<ul style="list-style-type: none"> <li>• Wait the full 24 hours recommended for authorization.</li> <li>• Run through the guide acquisition spot-checks. If all tests pass, tune to channel 100 and attempt reauthorization.</li> <li>• Verify that the account has been set up properly.</li> </ul>
Tuners locked to 103B channels lose their authorization every few days.	<ul style="list-style-type: none"> <li>• The COM24 network tuner is unable find the guide data from the 119 satellite.</li> </ul>	<ul style="list-style-type: none"> <li>• Revisit the RF installation guidelines.</li> <li>• Run through the guide acquisition spot-checks.</li> </ul>
Frequent macroblocking of the picture.	<ul style="list-style-type: none"> <li>• If the weather conditions are favorable, there could be an RF signaling problem.</li> <li>• If only high-action channels are affected, it could be a problem with the QAM setup.</li> </ul>	<ul style="list-style-type: none"> <li>• Try to isolate the problem to a particular tuner or frequency by temporarily changing the DIRECTV channel.</li> <li>• Verify that the installer has not attempted to "stack" three (3) HD DIRECTV programs onto a single QAM channel.</li> </ul>
Pink and green blocks on TV.	<ul style="list-style-type: none"> <li>• Problem with the Pro:Idiom decode path.</li> <li>• This may be seen at power-up of some TV models.</li> <li>• The TV you are trying to use does not support Pro:Idiom encryption.</li> </ul>	<ul style="list-style-type: none"> <li>• Change the television channel.</li> <li>• Check television model for Pro:Idiom encryption capability.</li> </ul>
COM24 cards only tune to SD versions of channels.	<ul style="list-style-type: none"> <li>• Possible RF signaling problem.</li> <li>• Possible guide acquisition problem.</li> <li>• Possible entitlement problem.</li> </ul>	<ul style="list-style-type: none"> <li>• Revisit the RF installation guidelines.</li> <li>• Run through the guide acquisition spot-checks.</li> </ul>
No video on one channel.	<ul style="list-style-type: none"> <li>• Possible RF signaling problem.</li> <li>• Possible authorization problem.</li> </ul>	<ul style="list-style-type: none"> <li>• Try tuning to other networks to rule out B band converter issues.</li> <li>• Check the CAM log for authorization problems. If found, tune to channel 100 and attempt reauthorization.</li> </ul>

Problem/ Condition	Possible Interpretations	What to do
No video on multiple channels.	<ul style="list-style-type: none"> <li>• If the channels are supposed to be coming from the same slot, it could mean a problem with that COM24 card</li> <li>• If the channels are on different cards, it could mean an RF signaling problem</li> <li>• If the channels are on different cards, it could mean a guide acquisition problem</li> </ul>	<ul style="list-style-type: none"> <li>• Verify that the PWR and Tuner LEDs behave as expected</li> <li>• Verify that there are no authorization problems with the affected cards. If there are, tune to channel 100 and re-attempt the authorization process</li> </ul>
Cannot execute file transfers.	<ul style="list-style-type: none"> <li>• Firewall might be blocking transfers.</li> <li>• TFTP server setup issues.</li> <li>• IP address issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Disable third-party firewalls.</li> <li>• Refer to <b>Section 7</b> and check for errors in upgrade settings.</li> <li>• Verify that the PC and the card are on the same subnet (i.e. 192.168.3.xxx)</li> </ul>
A card appears to be “stuck” on the old revision of firmware.	<ul style="list-style-type: none"> <li>• Firmware bug makes a small number of cards use the wrong IP address for software update requests.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to <b>Section 7</b> and check for errors in upgrade settings.</li> <li>• Look for an address like 169.255.7.xxx in the TFTP logs. If found, temporarily remap the PC’s IP address to a matching subnet.</li> </ul>
When attempting to upgrade a full chassis, the last couple of cards do not upgrade.	<ul style="list-style-type: none"> <li>• If there are more than six cards in a chassis, the first card will get to the reset stage before the last six cards receive the upgrade request.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to <b>Section 7</b> and check for errors in upgrade settings.</li> <li>• Initiate the upgrades from the highest-numbered slot in the chassis.</li> </ul>
Cards cannot be upgraded when using the integrated switch of a COM200 chassis.	<ul style="list-style-type: none"> <li>• This is due to a limitation in the initial production run of the COM24 cards; it is only an issue when these cards are placed in a COM200 chassis.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to <b>Section 7</b> and check for errors in upgrade settings.</li> <li>• Connect the cards; front Ethernet ports to an external switch and upgrade in the same manner as with a COM100 chassis.</li> </ul>
Cannot talk to / find cards.	<ul style="list-style-type: none"> <li>• Possible IP routing problems on PC.</li> <li>• Possible Ethernet cable / port problems.</li> </ul>	<ul style="list-style-type: none"> <li>• Disable wireless interface on PC and try again.</li> <li>• Try switching around Ethernet cables / ports.</li> </ul>
Frequent macroblocking when transcoding.	<ul style="list-style-type: none"> <li>• This will happen periodically during high-action sequences.</li> <li>• The channels could be exceeding the QAM channel’s bandwidth capacity</li> <li>• The card is also hosting an EPG.</li> <li>• You are using a COM100 chassis.</li> <li>• The front Ethernet port jumpers are missing.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid assigning two high-action channels to the same COM24 card.</li> <li>• Be sure that both tuners on a COM24 card are mapped to the same QAM channel.</li> <li>• Host the EPG on a non-transcoding card.</li> <li>• Be sure you are using a COM200 chassis.</li> <li>• Be sure that there is a jumper cable between each COM24/XDR24 pair.</li> </ul>



Problem/ Condition	Possible Interpretations	What to do
<p>Video quality is severely degraded when using an IP-only distribution system.</p>	<ul style="list-style-type: none"> <li>• Older COM200 Chassis (pseudo codes BC004 and NC004) require that multicast streams be sent out the front port and an external Ethernet switch be used.</li> <li>• You are attempting to stream transcoded content.</li> </ul>	<ul style="list-style-type: none"> <li>• In such an installation, an external GbE switch will be required.</li> <li>• Due to the high bitrate requirements of the transcode operation, multicast distribution of transcoded streams is not feasible.</li> </ul>



